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LABORATORY
OF THE
INLAND REVENUE DEPARTMENT
OTTAWA, CANADA

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BULLETIN No 86

FERTILIZERS



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OF THE
INLAND REVENUE DEPARTMENT

BULLETIN No. 86

FERTILIZERS, 1903.

OTTAWA, June 21, 1903.

W. J. GERALD, Esq.,
Deputy Minister of Inland Revenue.

SIR.—I submit herewith a tabulated statement, marked Table I., containing a description of 128 standard samples of agricultural fertilizers, which were sent in to the Department of Inland Revenue by their manufacturers, importers or vendors, in accordance with the provisions of the Fertilizers Act, 1890, and as representing the goods which it was proposed to offer for sale in Canada during the season, 1903–4. There is a slight increase in the number of standard samples this year compared with the three preceding seasons, as will be evident from the following statement :—

In 1897 there were 107 standard samples submitted.					
1898	"	124	"	"	"
1899	"	154	"	"	"
1900	"	107	"	"	"
1901	"	102	"	"	"
1902	"	106	"	"	"
1903	"	128	"	"	"

Table I. gives the designations of the various brands of fertilizers, the names of the manufacturers, the claims made as regards their contents in fertilizing ingredients, and the actual quantities of these found in the standard samples on analysis in this laboratory. The guaranteed contents are given in the upper line, and the analytical results in the second line placed opposite the designation of the fertilizer. In many cases the claims made are imperfect and indefinite, and, in some, the requirements of the Act calling for a certificate of analysis, and a statement of the materials used in the manufacture of the fertilizer have been neglected. With regard to indefinite claims it may be mentioned that these are often made by reputable makers, when a particular fertilizer is described as containing say 'from 2.5 to 3.0 p.c. of ammonia,' or 'from 8 to 9 of available phosphoric acid,' or 'from 9.5 to 11.0 p.c. of potash.' In such instances if an ingredient is found deficient, and the sample is challenged, the manufacturer often defends himself by maintaining that his guarantee does not extend above the lowest of

the figures mentioned. For this reason the 'guaranteed contents' of a fertilizer, as stated in Table I, must be understood to indicate only the lowest percentage given in the manufacturers' label, or in his communications to the department.

As required by the Fertilizer Act, Table I. also contains a column in which 'the relative value of each fertilizer calculated from the contents in fertilizing ingredients' is given, the prices of these ingredients being as follows:—

	Cents Per Lb.
Nitrogen in salts of ammonia or nitrates, as well as in compound fertilizers.....	13
Organic nitrogen in ground bone, fish, blood or tankage.....	12
Phosphoric acid:—	
Soluble, in water.....	6
Soluble, in 1 p.c. citric acid.....	5½
Insoluble in Thomas phosphate powder.....	3½
Insoluble, in ground rock phosphate and fertilizers generally	1½
Potash, contained in wood ashes.....	6
Potash from high grade salts.....	5¼

The valuation of each brand is calculated on the results of the analysis of the standard samples, but it has been omitted in the case of the guaranteed contents on account of the imperfect character of the information supplied in the majority of cases.

I have also to submit a description of the fertilizer samples which were collected, as sold in the open market, in accordance with the instructions received from you on 27th March last. This description is called Table II, and contains the date of collecting the samples, the names of the vendors and manufacturers, the designation of the brand, and the results of the analyses. The figures obtained in examining the sample as sold are given in the third line following the name of the fertilizer, and on the second will be found the analysis of the corresponding standard sample, as well as its valuation. In cases where no standard samples have been sent in to the department and, nevertheless, in contravention of the Fertilizer Act, the fertilizers have been offered for sale it has of course not been found possible to give either the guaranteed contents or the analysis of a standard sample. The number of such fertilizers not registered and therefore illegally sold, amounts to ten, which is slightly less than in former years.

According to the opinions expressed by the analysts 9 out of the 84 samples collected as sold have been found to be adulterated, according to the Act, being deficient in available phosphoric acid or other fertilizing constituents, or have been indicated as being 'below guarantee.' It not unfrequently happens that the fertilizing constituents of the standard samples show higher percentages than claimed in the guarantee of the manufacturers. Nevertheless, the latter must be used by the analysts in judging of the genuineness of a sample, and where the figures of the guarantee are defective it becomes almost impossible to give an opinion. It is therefore very important that when standard samples are supplied by vendors or manufacturers, they should be accompanied by certificates of analysis, or at least by a statement of the lowest guaranteed percentages of every fertilizing constituent present.

It will be remembered that in my report of May 13, 1901, (Bulletin No. 75) the proceedings were fully detailed which led to an alteration in the method of determining the available phosphoric acid in fertilizers, the adoption of which was then authorized by the Commissioner of Inland Revenue, and has since been carried out in this laboratory and in those of the district analysts. Since many manufacturers in the United States still continue to mention, in their guarantees, a percentage of 'reverted' phosphoric acid, it seems necessary to state that in Canada a determination of 'citric soluble' phosphoric acid is made, and the determination of 'reverted' discontinued. It would also seem to be advisable to repeat here the details of the process adopted in Canada for ascertaining the percentage of 'available' phosphoric acid contained in agricultural fertilizers:—

Citric insoluble phosphoric acid.

(a) In acidulated samples—Introduce the filter containing the washed residue from the determination of soluble phosphoric acid in two grammes of the original sample

into a flask with 100 cc of 1 per cent citric acid solution, stopper tightly and shake violently until the filter paper is reduced to a pulp. Add 100 cc additional of the 1 per cent citric acid solution and digest at room temperature for half an hour, shaking the flasks thoroughly every five minutes. With five analyses in hand this means an agitation of one minute duration repeated six times. Filter and wash thoroughly. Dry and transfer the filter and its contents to a crucible, ignite until all organic matter is destroyed, add from 10 to 15 cc of strong nitric or hydrochloric acid and digest until all phosphate is dissolved. Dilute the solution to 200 cc, mix well, filter through a dry filter and proceed as for the estimation of total phosphoric acid.

(b) In non-acidulated samples.—In case a determination of citric insoluble phosphoric acid is required in non-acidulated samples, such as mineral phosphates, basic slag, Thomas phosphate powder, ground bone, bone char or bone ash, it is to be made by taking two grammes of the phosphatic material (without previous washing with water) and introducing it into a flask with 100 cc of a 5 per cent solution of ammonium chloride and boiling it for forty minutes, replacing always the evaporated water, then filtering and washing the residue and treating it, exactly as above described with 1 per cent citric acid solution, determining the phosphoric acid in the residue.

Citric Soluble Phosphoric Acid.—The sum of the water-soluble and the citric-insoluble phosphoric acid subtracted from the total contained in the fertilizer gives the citric-soluble phosphoric acid.

The sum of the latter and the water-soluble phosphoric acid is to be regarded as 'available phosphoric acid.'

I beg to recommend the publication of this report, together with Tables I and II, as well as the 'Memoranda on Manures,' which it has been customary to print at the same time.

I have the honour to be, sir,
Your obedient servant,

THOMAS MACFARLANE,
Chief Analyst.

TABLE I.—Statement of the results of examining 128

Number of Sample	Designation.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	
1363	Great Eastern Grass and Oats Fertilizer.	American Agricultural Chemical Co.	Great Eastern Fertilizer Branch, Rutland, Vermont.	.....	Guaranteed contents Standard sample....
1364	Great Eastern Northern Corn Special Fertilizer.	"	"	.....	Guaranteed contents Standard sample ...
1365	Great Eastern General Fertilizer.	"	"	.....	Guaranteed contents Standard sample...
1366	Great Eastern Potato Manure Fertilizer.	"	"	.....	Guaranteed contents Standard sample ...
1367	Plain Superphosphate.	"	"	.....	Guaranteed contents Standard sample...
1368	Essex Complete for Corn, Grain and Grass Fertilizer.	Russia Cement Co.	S. C. Shaffner, Granville Ferry, N.S.	.....	Guaranteed contents Standard sample ...
1369	Essex Complete for Potatoe, Roots and Vegetable.	"	"	.....	Guaranteed contents Standard sample....
1370	Fish and Potash ....	"	"	.....	Guaranteed contents Standard sample....
1371	Essex Orchard Fertilizer.	"	"	.....	Guaranteed contents Standard sample...
1372	Essex Dry Ground Fish.	"	"	.....	Guaranteed contents Standard sample...
1373	Essex Raw Bone...	"	"	.....	Guaranteed contents Standard sample...
1374	Essex 'A 1' Super-phosphate.	"	"	.....	Guaranteed contents Standard sample ...
1375	Potatoe Phosphate.	Provincial Chemical Fertilizer Co., St. John, N.B.	Manufacturers	.....	Guaranteed contents Standard sample...
1376	Imperial Superphosphate.	"	"	.....	Guaranteed contents Standard sample ...
1377	Fruit Tree Fertilizer	"	"	.....	Guaranteed contents Standard sample...
1378	Victor Guano.	"	"	.....	Guaranteed contents Standard sample...
1379	Bone Meal.	"	"	.....	Guaranteed contents Standard sample...
1380	Bone, Blood and Potash.	"	"	.....	Guaranteed contents Standard sample...
1381	Exhibit 'B'	Wm. Davies Co., Limited, Toronto	"	Dried Blood, Bones and Tankage.	Guaranteed contents Standard sample...
1382	Exhibit 'A'	Harris Abattoir Co., Ltd.	Edward Adie, Secretary Treasurer, Toronto.	"	Guaranteed contents Standard sample...
1383	Capelton Superphosphate.	Nichols Chemical Co. of Canada, L. M. Capelton, P.Q.	S. L. Spafford, Manager, Capelton, Que.	Canadian Apatite dissolved in Sulphuric Acid, Muriate of Potash, and Sulphate of Ammonia.	Guaranteed contents Standard sample...

Standard Samples of Commercial Fertilizers, registered for 1903.

RESULTS OF ANALYSIS.										Relative value per ton of 2,000 lbs	Name of Analyst and Remarks.
Nitrogen.		Phosphoric Acid.					Potash.	Moisture.			
Total, including Nitric Acid and Ammonia.	Total calculated as Ammonia.	Soluble in Water.	Citric Soluble.	In-soluble.	Total.	Total Available.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	\$ cts.		
0.77	0.93	6.90	11.19	0.00	2.88	12.00	11.00	6.24	10.90	21.04	Miss S. E. Wright.
1.05	2.36	5.00	8.15	0.33	3.51	10.00	8.00	1.50	12.40	18.15	"
1.05	1.27	5.00	7.03	4.01	2.56	10.00	8.48	1.80	12.60	21.06	"
1.00	2.31	5.00	7.99	2.0	3.21	13.00	10.00	3.00	13.60	20.87	"
0.91	0.37	11.04	2.40	4.95	18.30	13.44	14.00	11.70	18.16	"	
2.58	3.13	6.72	2.40	2.23	11.35	9.12	10.50	3.60	3.17	Miss E. Davidson.	
3.29	4.50	3.00	4.00	3.05	14.07	10.05	9.00	6.84	30.78	"	
2.18	2.67	4.50	5.60	5.11	12.00	9.00	2.25				
2.00	2.00	4.00	4.15	4.86	10.71	4.16	9.72				
2.56	3.11	4.48	4.00	3.00	13.50	8.00	8.50				
8.00	9.74	2.07	10.73	3.03	15.83	12.80	8.00				
3.50	4.00	18.00	12.79	12.05	25.74	12.79	7.64				
5.00	6.07	12.00	12.79	12.05	35.74	12.79	7.64				
1.00	1.32	3.36	6.88	4.31	14.55	10.24	3.28	4.50			
3.19	3.87	6.71	1.63	4.77	13.11	8.34	5.23	10.00		Miss S. E. Wright.	
3.03	3.68	7.35	2.73	7.67	17.75	10.50	1.50				
3.02	3.67	8.15	1.48	4.60	14.23	10.08	1.35	11.05	23.41	"	
1.95	2.36	6.08	3.20	6.55	15.83	9.00	6.00				
4.62	5.61	14.88	6.07	24.14	20.95	14.88	7.00	2.50	26.00	"	
1.64	2.00	6.88	2.24	6.39	15.51	9.12	4.00	7.50	29.26	"	
7.14	8.67	trace	14.23	1.92	16.15	14.23	7.74	6.27	7.15	23.16	"
6.97	8.46	14.23	1.92	8.61	14.23	7.74	6.45	9.45	41.09	"	
7.21	9.43	8.61	1.44	5.28	14.23	7.74	6.90	7.20	26.03	"	
8.65	10.51	1.60	2.24	1.44	8.00	3.84	6.44	7.20	22.15	"	
2.00	2.53	8.15	2.57	6.07	16.79	10.72	2.18	11.25			

TABLE I.—Statement of the Results of Examining 128 Standard Samples

Number of Sample.	Designation.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	—
1384 No. 1 Grade	Nichols Chemical Co. of Canada, L. M. Culperton, P.Q.	S. L. Stafford, Manager, Capelton, Que.	Canadian Apatite dissolved in Sulphuric Acid, Muriate of Potash, and Sulphate of Ammonia.	Guaranteed contents Standard sample...	
1385 Reliance	" ..	" ..	" ..	Guaranteed contents Standard sample...	
1386 Royal Canadian....	" ..	" ..	" ..	Guaranteed contents Standard sample...	
1387 Victor	" ..	" ..	" ..	Guaranteed contents Standard sample...	
1388 Crown	" ..	" ..	" ..	Guaranteed contents Standard sample...	
1389 Reid's Superphosphate.	Thos. Reid, St. John, N.B.	Manufacturer, St. John, N.B.		Guaranteed contents Standard sample...	
1390 Crocker's Wheat and Corn Fertilizer.	American Agricultural Chemical Co., of Buffalo, N.Y.	Geo. W. Bingham, Local Manager.		Guaranteed contents Standard sample...	
1391 Crocker's Cabbage and Potato Manure.	" ..	" ..		Guaranteed contents Standard sample...	
1392 Crocker's Harvest Jewel.	" ..	" ..		Guaranteed contents Standard sample...	
1393 Crocker's Ammoniated Bone.	" ..	" ..		Guaranteed contents Standard sample...	
1394 Fertilizer.....	Laing Packing and Provision Co., Ltd., Montreal.	Manufacturer, Montreal.	Offal, Blood and Bones of Hogs.	Guaranteed contents Standard sample...	
1395 High Grade Potato Manure.	American Agricultural Chemical Co. of Rutland, Vt.	Great Eastern Fertilizer Branch, Rutland, Vt.		Guaranteed contents Standard sample...	
1396 Thomas' Phosphate Powder.	Chemical Works of H. & E. Albert, 15 Philpot Lane, London, Eng.	" ..	Basic slag made at Middlesborough, England.	Standard sample...	
1397 Williams & Clark American Potato Manure.	American Agricultural Chemical Co. of Boston, Mass.	Ross L. Coe, Local Treasurer, Boston.		Guaranteed contents Standard sample...	
1398 Pacific Potato Spec'l	" ..	" ..		Guaranteed contents Standard sample...	
1399 Pacific Nobisque Guano.	" ..	" ..		Guaranteed contents Standard sample...	
1400 Pacific Fine Ground Bone.	" ..	" ..		Guaranteed contents Standard sample...	
1401 Soluble Pacific Guano	" ..	" ..		Guaranteed contents Standard sample...	
1402 Tucker's Imperial Bone Superphosphate.	" ..	" ..		Guaranteed contents Standard sample...	
1403 Bradley's Eclipse Phosphate.	" ..	" ..		Guaranteed contents Standard sample...	

of Commercial Fertilizers, registered for 1903—Continued.

RESULTS OF ANALYSIS.

Nitrogen.		Phosphoric Acid.					Pot-ash.	Mois-ure.	Relative value per ton of 2,000 lbs	Name of Analyst and Remarks.
Total including Nitric Acid or Ammonia.	Total calculated as Ammonia.	Soluble in Water.	Citric Soluble.	In-soluble.	Total.	Total Available.				
p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	8 cts.	
trace.	trace.	13.91	1.28	3.04	18.23	15.19	0.50	9.65	19.52	Miss S. E. Wright.
2.28	2.77	5.27	3.69	3.51	12.47	6.00	2.00	11.25	22.23	"
4.00	5.11	8.95	0.14	3.83	12.92	9.09	5.99	7.05	39.75	Alphonse Lemoine.
4.21	5.11	8.95	0.14	3.83	12.92	9.09	5.99	7.05	39.75	Alphonse Lemoine.
2.53	3.07	10.65	0.97	4.40	15.92	11.52	2.94	9.90	24.60	"
2.00	2.47	3.00	7.51	3.55	13.1	11.06	2.50	12.3	24.40	"
3.44	4.18	4.46	2.56	5.59	12.63	7.04	3.12	19.08	22.06	Miss E. Davidson.
2.06	2.50	6.00	1.00	9.00	8.00	1.50	12.16	21.74	"	
2.75	3.34	7.51	2.09	2.71	12.31	9.60	2.37	1.20	21.74	"
2.00	3.00	6.00	1.00	9.00	8.00	6.00	12.16	25.26	"	
2.20	2.67	7.20	3.68	2.55	13.43	10.88	5.81	12.16	25.26	"
1.65	2.00	6.00	1.00	9.00	8.00	2.00	10.52	18.48	"	
1.60	2.04	7.19	1.77	2.37	11.35	8.96	2.91	10.52	18.48	"
2.40	3.00	6.00	2.00	11.00	9.00	2.00	10.44	21.22	"	
2.66	3.28	7.36	1.76	3.19	12.31	9.12	3.08	10.44	21.22	"
8.33	10.12	.....	.....	9.40	.....	.....	.....	.....	.....
8.36	10.15	1.28	6.88	1.75	9.91	8.16	0.27	11.96	29.97	"
3.07	4.00	6.00	1.00	7.00	6.00	10.00	7.60	18.82	Miss E. Davidson.	
.....	3.73	4.64	3.04	2.07	9.75	7.68	9.75	7.60	18.82	Miss E. Davidson.
.....	.....	.....	14.55	4.00	18.55	14.55	.....	0.20	18.80	"
2.06	2.50	5.00	2.00	2.00	10.00	8.00	3 to 4	13.88	21.66	"
2.41	2.92	6.72	2.72	2.71	12.15	9.44	3.32	13.88	21.66	"
2.06	2.50	5.00	2.00	2.00	10.00	8.00	3.00	13.44	17.34	Miss S. E. Wright.
2.38	2.89	7.52	2.24	2.71	12.47	9.76	3.44	13.92	22.08	"
1.08	1.25	6.00	2.00	10.00	8.00	2.00	1.50	1.50	27.49	"
1.53	1.85	6.55	1.92	3.20	11.67	8.47	2.00	13.44	17.34	Miss S. E. Wright.
2.50	3.00	.....	.....	21.00	.....	.....	.....	.....	.....
2.57	3.13	.....	17.60	6.55	24.15	17.60	.....	5.45	27.49	"
2.06	2.50	5.00	2.00	10.00	8.00	1.50	1.50	1.50	27.49	"
1.85	2.24	7.68	1.75	2.88	12.31	9.34	1.85	14.00	19.74	"
1.03	1.25	6.00	2.00	10.00	8.00	2.00	1.50	1.50	27.49	"
1.51	1.84	6.08	3.19	2.56	11.83	9.27	1.64	13.45	16.91	"
1.03	1.25	6.00	2.00	10.00	8.00	2.00	1.50	1.50	27.49	"
1.10	1.42	6.40	3.35	3.84	13.59	9.75	2.00	11.10	17.56	"

TABLE I.—Statement of the Results of Examining 128 Standard Samples

Number of Samples.	Designation.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	
1404	Bradley's XL Super-phosphate of Lime.	American Agricultural Chemical Co. of Boston, Mass.	Ross L. Coe, Local Treasurer, Boston.	.....	Guaranteed contents Standard sample....
1405	Bradley's Potato Fertilizer.	"	"	.....	Guaranteed contents Standard sample....
1406	Bradley's Farmers' New Method Fertilizer.	"	"	.....	Guaranteed contents Standard sample....
1407	Bradley's Fine Ground Bone.	"	"	.....	Guaranteed contents Standard sample....
1408	Read's Standard Superphosphate.	"	"	.....	Guaranteed contents Standard sample....
1409	Read's Practical Potato Special.	"	"	.....	Guaranteed contents Standard sample....
1410	Read's Sure Catch Fertilizer.	"	"	.....	Guaranteed contents Standard sample....
1411	Quininpiac Climax Phosphate for all crops.	"	"	.....	Guaranteed contents Standard sample....
1412	Cumberland Super-phosphate.	"	"	.....	Guaranteed contents Standard sample....
1413	Cumberland Potato Fertilizer.	"	"	.....	Guaranteed contents Standard sample....
1414	Cumberland Fine Ground Bone.	"	"	.....	Guaranteed contents Standard sample....
1415	Brand 'H' Fertilizer	W. Harris & Co., Manufacturers, Toronto.	.....	.....	"
1416	Bone Meal.	"	"	.....	"
1417	Superphosphates of Lime.	Standard Fertilizer & Chemical Co., Ltd., Smith's Falls, Ont.	R. J. Brodie, President and M'g'r, Smith's Falls.	Mineral phosphate	Guaranteed contents Standard sample....
1418	Special Fertilizer	"	"	Nitrate of soda, sulphate of ammonia, magnesia salts, mineral superphosphates, bone char and fine bone meal.	Guaranteed contents Standard sample....
1419	Standard Fertilizer	"	"	"	Guaranteed contents
1420	Star Fertilizer	"	"	"	Standard sample....
1421	No. 1 Fertilizer	"	"	"	Guaranteed contents
1422	Royal Fertilizer	"	"	"	Standard sample....
1423	Bone Meal	"	"	"	Guaranteed contents
1424	Nitrate of Soda	"	"	"	Standard sample....
1425	Freeman's Sure Growth Manure.	W.A. Freeman Co., Ltd., Hamilton, Ont.	Wm. Freeman, Hamilton, Ont.	.....	Guaranteed contents Standard sample....
1426	Freeman's Bone and Potash.	"	"	.....	Guaranteed contents Standard sample....

of Commercial Fertilizers, registered for 1903—Continued.

RESULTS OF ANALYSIS.											Relative value per ton of 2,000 lbs	Name of Analyst and Remarks.
Nitrogen.		Phosphoric Acid.					Potash.	Moisture.				
Total including Nitric Acid or Ammonia.	Total calculated as Ammonia.	Soluble in Water.	Citric Soluble.	In-soluble.	Total.	Total Available.						
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	\$ cts.		
2.06	2.50	5.00	2.00	10.00	8.00	1.50						
2.00	2.43	6.07	2.62	2.50	11.19	8.69	1.60	13.80	17.79	Alphonse Lemoine.		
2.06	2.50	5.06	2.00	10.00	8.00	3.00						
2.07	2.51	6.07	1.39	2.23	10.23	9.00	3.48	13.95	18.46	"		
1.03	1.25	6.00		2.00	10.00	8.00	2.00					
1.23	1.47	6.07	1.48	2.87	10.42	7.55	2.14	13.55	15.18	"		
2.50	3.00				21.00							
2.78	3.38	Trace	14.40	9.27	23.67	14.40						
0.82	1.00	5.00		2.00	10.00	8.00	4.00					
1.19	1.45	5.11	4.17	3.35	12.63	9.28	4.48	12.16	19.51	Miss E. Davidson.		
0.82	1.00	2.00		1.00	5.00	4.00	8.00					
1.06	1.29	3.49	2.41	2.07	8.47	6.40	8.68	6.04	19.96	"		
0.20	0.24	7.83	3.20	2.72	13.75	11.03	2.28	10.92	16.66	"		
1.03	1.25	6.00		2.00	10.00	8.00	2.00					
1.08	1.31	6.23	3.06	2.72	12.00	9.28	2.41	13.44	16.98	"		
0.06	2.50	5.00		2.00	10.00	8.00	1.50					
2.06	2.5	6.23	2.89	2.87	11.99	9.12	2.39	14.88	19.39	"		
2.06	2.50	5.00		2.00	10.00	8.00	3.00					
2.11	2.56	4.47	3.66	2.87	11.00	8.13	3.12	13.3	19.02	Alphonse Lemoine.		
2.50	3.00				21.00							
3.09	3.75		12.48	9.40	21.88	12.48						
8.51	10.33		3.71	3.32	7.03	3.71	Trace	14.95	27.21	"		
5.15	6.26		9.87	8.63	18.60	9.87						
		10.68	3.27	3.00	16.00	14.00						
					16.95	13.95						
								12.40	17.82	Miss E. Davidson.		
3.92	4.76	7.99	3.09	1.43	10.00	8.00	6.00					
					11.51	10.08	7.06	15.04	29.92	"		
2.96	2.50				11.00	9.00	2.00					
	3.58	8.64	1.67	2.55	12.86	10.31	2.76	13.24	23.54	"		
	2.00				7.00	5.00	2.00					
1.79	2.17	6.07	0.79	1.60	8.46	6.86	2.12	5.04	15.51	"		
	2.00				11.00	9.00	1.00					
1.89	2.29	7.68	2.15	2.71	12.54	9.83	1.89	16.44	19.28	"		
	2.00				10.00	8.00	3.00					
	2.43	5.56	2.13	2.87	10.55	7.68	3.08	10.4	18.24	Alphonse Lemoine.		
	4.00				20.00							
3.62	4.40	Trace	11.64	11.64	11.28	11.64	None	5.45	24.98	"		
	18.00											
15.40	18.70								40.04	"		
	3.50											
3.32	4.03	3.32	3.79	4.47	11.51	7.04	3.14	14.50	21.34	"		
	2.00				9.00							
2.78	3.38	3.19	3.63	4.15	10.87	6.73	6.03	13.45	22.01	"		

TABLE I.—Statement of the Results of Examining 128

Number of Sample.	Designation.	Name of Manufacturer.	By whom sent.	From what Materials Produced.
1427	Freeman's Celery and Early Vegetable Manure.	The W. A. Freeman Co., Ltd., Hamilton.	W. A. Freeman, Hamilton, Ont.	Guaranteed contents Standard sample...
1428	Freeman's Grass and Grain.	"	"	Guaranteed contents Standard sample...
1429	Freeman's Phosphate Powder.	"	"	Guaranteed contents Standard sample...
1430	Freeman's Potato Manure.	"	"	Guaranteed contents Standard sample...
1431	Freeman's Tankage Manure.	"	"	Guaranteed contents Standard sample...
1432	Freeman's Tobacco Manure.	"	"	Guaranteed contents Standard sample...
1433	Freeman's Pure Bone Meal.	"	"	Guaranteed contents Standard sample...
1434	Ingersoll Fertilizer	Ingersoll Packing Co., Ingersoll, Ont.	C. C. L. Wilson, manager, Ingersoll, Ont.	Blood, tankage and bone from the hog. Guaranteed contents Standard sample...
1435	Fertilizer	London Soap Co., Manufacturer, London, Ont.	"	Second sampling Standard sample...
1436	Bradley's New Method	The American Agricultural Chemical Co., Buffalo, N.Y.	Department, Buffalo, N.Y.	Guaranteed contents Standard sample...
1437	Bradley's B. D. Sea Fowl Guano.	"	"	Guaranteed contents Standard sample...
1438	Bradley's Complete Manure for Potatoes and Vegetables	"	"	Guaranteed contents Standard sample...
1439	Bowker's Vermont Phosphate.	Bowker Fertilizer Co., Boston, Mass.	F. Miller, advertising manager, Boston, U.S.	Bone, bone black, phosphoric guano, bone phosphates, dried blood meat or fish, sulphate of ammonia or nitrate of soda, sulphate of potash or muriate of potash and sulphuric acid. Guaranteed contents Standard sample...
1440	Bowker's Sure Crop Phosphate.	"	"	Guaranteed contents Standard sample...
1441	Bowker's Potash Bone.	"	"	Guaranteed contents Standard sample...
1442	Bowker's Farm and Garden Phosphate.	"	"	Guaranteed contents Standard sample...
1443	Bowker's Corn Phosphate.	"	"	Guaranteed contents Standard sample...
1444	Bowker's Bone and Potash Square Brand.	"	"	Guaranteed contents Standard sample...
1445	Bowker's Potato and Vegetable Phosphate.	"	"	Guaranteed contents Standard sample...
1446	Stockbridge Potato and Vegetable Manure.	"	"	Guaranteed contents Standard sample...

Standard Samples of Commercial Fertilizers, &c.—Continued.

RESULTS OF ANALYSIS.											Name of Analyst and Remarks.	
Nitrogen.		Phosphoric Acid.					Pot- ash.	Moist- ure.	Relative Value per Ton of 2,000 lbs.			
Total includ- ing Nitric Acid and Am- monia.	Total Calcu- lated as Am- monia.	Soluble in Water.	Citric Soluble.	Insol- uble.	Total.	Total Avail- able.						
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		
4·48	6·00	5·44	3·83	2·89	3·83	10·55	6·72	6·83	11·72	27·75	Miss E. Davidson.	
2·50	2·00	3·1'	2·87	3·37	3·83	10·07	6·24	3·47	10·16	18·67	"	
0·36	0·44	9·91	4·17	3·79	18·07	14·08	...	11·96	18·62	"		
2·96	3·58	4·31	3·53	4·79	12·63	7·84	7·54	13·16	26·02	"		
6·18	5·48	6·63	11·68	3·99	16·90	12·31	...	4·68	29·59	"		
5·64	6·86	3·6	3·44	3·32	10·36	7·04	6·30	11·00	26·48	Alphonse Lemoine.		
3·5	4·26	Nene.	13·24	13·56	26·8	13·24	None.	6·90	27·18	"		
7·92	9·00	8·40	Trace.	11·84	2·36	14·20	11·84	0·20	15·12	32·94	"	
7·67	9·32	9·32	...	11·99	2·72	14·71	11·99	Trace.	14·06	32·41	"	
9·21	11·18	Trace.	1·27	2·23	3·6	1·27	0·30	11·75	26·33	"		
0·82	1·00	1·21	1·47	5·56	4·04	1·00	9·00	8·00	2·00	16·62	"	
2·06	2·50	2·78	3·26	6·00	2·76	1·00	9·00	8·00	1·50	"		
3·29	4·00	4·14	5·03	6·00	2·50	2·11	10·94	8·83	1·62	14·66	19·88	
4·14	5·03	5·75	2·89	2·50	11·19	8·64	7·10	9·35	29·30	"		
2·45	3·00	2·98	5·24	3·72	1·92	10·00	8·00	4·50	13·00	21·99	"	
1·48	1·00	1·48	5·75	3·72	1·72	11·00	9·00	2·00	"	19·66	"	
1·23	1·00	1·49	2·11	4·61	1·72	8·00	6·00	2·00	"	13·33	"	
1·90	2·00	2·31	5·76	3·68	1·50	11·00	8·00	2·00	"	18·58	Miss E. Davidson.	
1·60	2·00	1·94	5·76	3·36	1·44	10·00	8·00	2·00	"	"		
1·63	2·00	1·97	3·00	5·13	4·79	10·00	6·00	2·00	11·64	17·28	"	
1·95	2·00	2·36	7·56	2·67	1·26	11·00	9·00	2·00	"	"		
3·32	4·00	4·03	5·12	2·40	1·50	9·11	7·00	10·00	7·52	20·48	"	
						9·11	7·52	11·43	9·16	20·89	"	

TABLE I.—Statement of the Results of Examining 128 Standard Samples

Number of Samples.	Designation.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	
1447	New England Corn Phosphate.	The New England Fertilizer Co., Boston, Mass.	A. P. Clarke, agent, Boston, Mass.	Blood, meat, bone, bone black, bone phosphates, nitrates of soda or sulphates of ammonia and sulphate or nitrate of potash.	Guaranteed contents Standard sample....
1448	New England Potato Fertilizer.	"	"		Guaranteed contents Standard sample....
1449	New England Seed-down Fertilizer	"	"		Guaranteed contents Standard sample....
1450	Swift's Lowell Bone Fertilizer.	Lowell Fertilizer Co., Boston, Mass.	Benjamin Moody, agent.	Blood, meat, bone, bone black, bone phosphates, nitrate of soda, or sulphate of ammonia and sulphate or nitrate of potash.	Guaranteed contents Standard sample....
1451	Swift's Lowell Potato Manure.	"			Guaranteed contents Standard sample....
1452	Swift's Lowell Potato Phosphate.	"			Guaranteed contents Standard sample....
1453	Swift's Lowell Animal Brand.	"			Guaranteed contents Standard sample....
1454	Swift's Lowell Ground Bone.	"			Guaranteed contents Standard sample....
1455	Packer's Union Potato Manure.	The American Agricultural Chemical Co., Rutland, Vt.	Packers Union Fertilizer Branch, Rutland, Vt.		Guaranteed contents Standard sample....
1456	Packer's Union Wheat, Oats and Clover Fertilizer.	"	"		Guaranteed contents Standard sample....
1457	Packer's Union Economical Vegetable Guano.	"	"		Guaranteed contents Standard sample....
1458	Palmerston Tankage	Palmerston Pork Packing Co.		Bone, blood and general packing house refuse.	Standard sample....
1459	Bone Meal.....	Darch & Hunter, London, Ont.			Standard sample....
1460	Alberts' Concentrated Soluble Horticultural Manure Brand A.G.	Chemical Works, late H. & E. Albert, Biebrick on Rhine.	F. W. Wedderburn, St. John, N.B.		Guaranteed contents Standard sample....
1461	Potato Phosphate...	Nova Scotia Fertilizer Co., Halifax, N.S.	C. M. Jack, Halifax, N.S.	Bonechar, bone, dried blood, tankage, bone phosphates, sulphate of ammonia, nitrate of soda, high grade nitrate of potash or sulphate of potash, and sulphuric acid.	Guaranteed contents Standard sample....
1462	Ceres Superphosphate.	"	"		Guaranteed contents Standard sample....
1463	Bone Meal	"	"		Guaranteed contents Standard sample....
1464	Strawberry Phosphate.	"	"		Guaranteed contents Standard sample....
1465	Apple Tree Phosphate.	"	"		Guaranteed contents Standard sample....

of Commercial Fertilizers, registered for 1903—Continued.

RESULTS OF ANALYSIS.

Nitrogen.		Phosphoric Acid.						Potash.	Mois- ure.	Relative value per ton of 2,000 lbs	Name of Analyst and Remarks.
Total includ- ing Nitric Acid or Am- monia.	Total calculat- ed as Am- monia.	Soluble in Water.	Citric Solub.	In- soluble.	Total.	Total Avail- able.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	\$ cts.	
2.00	2.40	5.11	3.65	1.28	9.00	8.00	3.00	9.7	19.32		Alphonse Lemoine.
1.98	2.40	5.11	3.65	1.28	10.04	8.76	3.48				"
2.00	2.38	5.11	3.08	1.08	8.00	7.00	4.00				"
1.94	2.38	5.11	3.08	1.08	9.27	8.19	4.51	7.6	19.02		"
1.50					8.00	7.00	2.00				"
1.73	2.09	4.60	3.97	0.70	9.27	8.57	2.27	9.15	16.98		"
2.00	2.23	5.43	3.86	1.08	9.00	8.00	3.00				"
1.84	2.23	5.43	3.86	1.08	10.36	9.28	3.35	10.15	19.00		"
2.00	2.26	5.43	2.43	0.9	8.00	7.00	4.00				"
1.87	2.26	5.43	2.43	0.9	8.76	7.86	4.65	7.1	19.20		"
3.0					9.00	8.00	6.00				"
2.88	3.50	7.83	2.41	1.59	11.83	10.34	5.86	7.84	26.16		Miss E. Davidson.
3.00					10.00	9.00	4.00				"
2.78	3.38	7.90	2.88	0.80	11.67	10.87	3.99	9.72	24.42		"
3					23.00						"
2.99	3.63		14.23	12.96	27.18	14.23			6.28	26.71	
2.06	2.50	5.00		1.00	10.00	8.00	6.00				"
2.23	2.70	5.43	5.29	1.91	12.68	10.72	6.47	10.68	25.50		"
Trace.	Trace.	6.00		1.00	12.00	11.00	2.00				"
Trace.	Trace.	7.99	3.37	2.39	13.75	11.38	2.24	11.00	16.37		"
1.25	1.50	4.50		1.00	7.00	6.00	3.00				"
2.25	2.73	4.00	4.21	5.88	14.71	8.83	2.25	13.2	21.19		Alphonse Lemoine.
6.37	7.73	Trace.	9.15	2.36	11.51	9.15	1.81	13.2	27.96		Alphonse Lemoine.
2.28	2.77	Trace.	12.85	15.35	28.2	12.85			3.50	24.20	
12.62	11.01										"
12.82	15.56	9.91	2.05		11.96	11.96	18.90	1.85	67.31		"
3.39	3.71										"
4.01	4.92	0.84	1.91		7.82		4.70				"
					7.67	5.76	3.71	9.30	19.21		"
2.00					9.16						"
2.63	3.19	6.07	1.77	1.91	9.75	7.84	5.12	7.37	22.02		Miss S. E. Wright.
3.00					22.90						"
2.98	3.62	Trace.	15.06	10.30	26.05	15.60			8.75	27.50	
2.02					8.25		6.50				"
2.23	2.70	3.83	3.84	2.72	10.39	7.67	6.45	6.15	22.21		"
3.20					7.82		6.52				"
2.65	3.11	4.15	1.92	3.04	9.11	6.07	7.13	6.85	22.38		"

TABLE I.—Statement of the Results of Examining 128 Standard Samples

Number of Sample.	Designation.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	
1466	Ground Bone.....	The Dominion Packing Co.	W. D. Haddlesay, Charlottetown, P.E.I.		Standard sample .
1467	Dried Blood.....	" " ..	" "		Standard sample .
1468	Tankage.....	" " ..	" "	Blood, bone, and tankage or the offal from animals.	" .
1469	Mixed Fertilizer....	" " ..	" "	Blood, bone tankage, muriate of potash and nitrate of soda.	" .
1470	Fertilizer, Bone Meal		Illesley & Harvey, Port William, N.S.		" .
1471	Honestead, a Bone Black Fertilizer.	Michigan Carbon, Detroit, Mich.	Wm. H. Burtenshaw, Sec. Treas'r, Detroit.		Guaranteed contents Standard sample .
1472	Honestead Potato and Tobacco Fertilizer.	" " ..	" "		Guaranteed contents Standard sample .
1473	Pew Animal Bone Potash.	" " ..	" "		Guaranteed contents Standard sample .
1474	D. Coated Bone....	" " ..	" "		Guaranteed contents Standard sample .
1475	Market Garden and Potato Fertilizer.	Russia Cement Co., Gloucester, Mass.	S. C. Shaffner, Granville Ferry, N.S.		Guaranteed contents Standard sample .
1476	Muriate of Potash..	Victoria Chemical Co., Ltd., Victoria, B.C.	John A. Hall, Treasurer, Victoria, B.C.		Guaranteed contents Standard sample .
1477	Kainite.....	" " ..	" "		Guaranteed contents Standard sample .
1478	Sulphate of Potash ..	" " ..	" "		Guaranteed contents Standard sample .
1479	Thomas' Phosphate Powder.	" " ..	" "		Guaranteed contents Standard sample .
1480	Nitrate of Soda. .	" " ..	" "		Guaranteed contents Standard sample .
1481	Superphosphate of Lime.	" " ..	" "	Spent bone, char and sulphuric acid.	Guaranteed contents Standard sample .
1482	Fertilizer A .. .	" " ..	" "	Nitrate of soda, muriate of potash and superphosphate of lime.	Guaranteed contents Standard sample .
1483	" B .. .	" " ..	" "	" " ..	Guaranteed contents Standard sample .
1484	" C .. .	" " ..	" "	Muriate of potash and superphosphate of lime.	Guaranteed contents Standard sample .
1485	Offal. .	Black & Shortreed, Fergus, Ont.	Manufacturers...	Bone, sinew and offal of beef animals only.	Standard sample .
1486	Dried Blood.....	" " ..	" "		Standard sample .

Samples of Commercial Fertilizers, &c.—Continued.

RESULTS OF ANALYSIS.

Nitrogen.		Phosphoric Acid.					Potash.	Moisture.	Relative value per ton of 2,000 lbs	Name of Analyst and Remarks.
Total including Nitric Acid or Ammonia.	Total calculated as Ammonia.	Soluble in Water.	Citric Soluble.	In-soluble.	Total.	Total Available.				
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	\$ cts.	
4·17	5·07	.....	13·43	7·35	20·78	13·43	.....	8·00	26·98	Miss E. Davidson.
66	11·73	0·64	1·61	0·31	2·56	2·25	2·23	29·96	28·52	"
5·32	6·46	0·63	12·16	6·71	19·50	12·79	2·33	7·20	31·37	"
4·98	6·05	0·95	9·77	4·15	14·92	10·72	7·78	6·48	33·25	"
4·15	5·06	Trace.	6·07	20·31	26·38	6·07	1·98	7·52	24·78	"
2·06	2·50	.....	.....	.....	9·00	8·00	1·50	.....	.....
1·98	2·41	7·35	0·65	1·91	9·91	8·00	1·97	12·06	16·93	Alphonse Lemoine.
2·16	2·50	.....	.....	.....	9·00	8·00	3·00	.....	.....
2·03	2·46	7·35	0·51	1·20	9·14	7·86	3·31	11·90	18·49	"
0·82	1·00	.....	.....	.....	22·00	.....	6·00	.....	.....
0·88	1·07	None.	16·63	14·52	31·15	16·63	5·95	1·80	31·00	"
1·50	1·54	None.	17·01	15·99	33·00	17·01	Trace.	2·75	26·56	"
1·27	2·40	4·00	2·00	10·00	10·00	8·00	5·00	.....	.....
2·00	2·53	3·83	7·69	3·51	15·03	11·52	6·37	10·5	26·23	"
.....	.....	.....	.....	.....	.....	53·00	.....	.....	.....
.....	.....	.....	.....	.....	.....	55·58	0·12	58·36	Miss E. Davidson.	
.....	.....	.....	.....	.....	.....	.....	12·00	.....	.....
.....	.....	.....	.....	.....	.....	.....	13·93	10·08	14·63	"
.....	.....	.....	.....	.....	.....	.....	53·00	.....	.....
.....	.....	.....	.....	.....	.....	.....	53·46	6·00	56·13	"
16·00	19·35	.....	.....	.....	15·00	.....	.....	.....	.....
15·93	19·35	.....	.....	.....	12·47	4·31	16·78	12·47	.....
Trace.	Trace.	16·12	2·56	0·64	16·00	19·32	18·68	.....	12·70	22·35
4·00	4·20	10·55	0·96	0·64	10·00	11·51	7·00	0·04	16·74	"
3·46	3·38	10·23	1·60	.....	9·00	11·83	12·03	9·40	33·92	"
3·50	3·38	10·23	1·60	.....	12·50	.....	11·00	.....	.....
2·79	3·38	10·23	1·60	.....	15·99	15·99	11·56	9·10	31·16	"
6·56	7·98	1·28	6·94	5·08	13·30	8·22	0·75	6·40	27·23	"
10·10	12·27	1·28	0·38	0·70	2·36	1·66	0·61	20·35	27·54	"

TABLE I. Statement of the Results of examining 128 Standard

Number of Sample.	Designation.	Name of Manufacturer.	By whom sent.	From what Materials Produced.	
1487	Eureka Potate Manure.	Pidgeon Fertilizer Co., Ltd., Windsor, N.S.	Robert Pidgeon, Manager.		Standard sample . . .
1488	Eureka Phosphate . . .	" " "	" " "	" " "	Standard sample . . .
1489	Intense Brand . . .	" " "	" " "	" " "	Standard sample . . .
1490	Ground Bone . . .	" " "	" " "	" " "	Standard sample . . .

Samples of Commercial Fertilisers, registered for 1903—Concluded.

RESULTS OF ANALYSIS.

Nitrogen.		Phosphoric Acid.					Relative value per ton of 2,000 lbs	Name of Analyst and Remarks.	
Total inclining Nitric Acid and Ammonium.	Total calculated as Ammonia.	Soluble in Water.	Citric Soluble.	In-soluble.	Total.	Total available.			
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	\$ cts.
3.07	3.73	1.91	0.97	8.12	11.00	2.88	5.06	9.10	19.08
2.87	3.48	0.48	2.40	9.27	12.15	2.88	2.35	11.00	15.93
2.27	2.75	0.64	0.96	8.31	9.91	1.60	5.31	12.28	15.79
2.37	2.87	.....	16.31	7.03	23.34	16.31	6.88	27.74	Miss E. Davidson.

TABLE II.—Results of the Examination of 84

NAME AND ADDRESS OF				Nitrogen.	
Date of Collection.	No. of Sample.	Vendor.	Manufacturer or Furnisher as given by Vendor.	Name or Brand of Fertilizer.	Total including that of Nitric acid or Ammonia if present.
					Total calculated as Ammonia.
1903.					p. c. p. c.
April 16	20236	L. E. Wyman, Yar-	Swift Fertilizer Co., Potato Phosphate-		
		mouth, N.S.	Lowell, Mass.	As guaranteed	3.06
				Standard sample (1452)	3.50
				Sample as sold	3.34
" 18	20242	W. M. Carruthers, Russie-	Cement Co., Corn, Grain and Grass Brand-		
		Cement Co., Corn, Grain and Grass Brand-	Kentville, N.S. Gloucester, U.S.	As guaranteed	4.00
				Standard sample (1368)	3.13
" 18	20243	"	"	Sample as sold	4.50
				Potatoes, Roots and Vegetable	
				Fertilizer	
				As guaranteed	4.50
				Standard sample (1360)	4.00
				Sample as sold	4.96
" 18	20244	Wolfville Coal Co., Bowker & Co., Boston,	Stockbridge Brand-		
		Wolfville, N.S.	Mass.	As guaranteed	1.00
				Standard sample (1446)	1.32
" 18	20245	"	"	Sample as sold	1.03
				Potato Phosphate	
				As guaranteed	2.00
				Standard sample (1445)	2.36
" 18	20247	Hiley and Harvey, Vendors,	Calcutta Bone		
		Wolfville, N.S.		As guaranteed	2.43
				Standard sample (1470)	5.05
" 18	20251	E. W. Dimock, Nova Scotia Fert. Ground Bone-			
		Windsor, N.S.	Co., Halifax.	As guaranteed	3.00
				Standard sample (1463)	3.62
" 22	20303	J. H. Kent, Truro, Bowker & Co., Bos-	Fresh Ground Bone-		
		N.S.	Boston, Mass.	As guaranteed	3.62
				Standard sample	
" 30	20324	Wm. McV. Smith, Hattie & Mylins, Imperial Superphosphate -			
		Dartmouth, N.S.	Halifax (Provincial	As guaranteed	3.82
			Chemical Fertilizer	Standard sample (1376)	3.00
			Co., St. John, N.B.)	Sample as sold	3.68
" 30	20327	E. M. Walker, American Agricul-	Potato Special Fertilizer -		
		Dartmouth, N.S.	ral Chemical Co.,	As guaranteed	2.02
			Boston.	Standard sample (1398)	2.50
" 20	4325	R. I. Holman, Sum-	Thomas Phosphate		
		merside, P.E.I.	Wallace & Frazer, St. Alberts, John, N.B.	As guaranteed	2.89
				Standard sample (1396)	2.17
				Sample as sold	
" 23	4343	R. E. Mutch, Charlottetown.	Nova Scotia Fertilizer Potato Phosphate		
			Co., Halifax, N.S.	As guaranteed on label	3.71
				Standard sample (1461)	4.01
" 23	4344	A. Gill, Charlotte-	Potato and Vegetable Phosphate		
		town, P.E.I.	Co., Boston, Mass.	As guaranteed on label	1.19
				Standard sample (1445)	2.00
				Sample as sold	2.36

Samples of Fertilizers as sold in 1903.

RESULTS OF ANALYSIS.

Phosphoric Acid.						Relative value per ton of 2,000 lbs.	Name of Analyst and Remarks.	
Soluble in Water.	Citric soluble.	In-soluble.	Total.	Total Available.	Potash.	Moisture.		
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.		8 cts.
7.83	2.41	1.59	9.00	8.00	6.00	7.84	26.16	20235
6.84	2.26	1.40	11.83	10.24	5.85	7.15	26.86	Mr. A. Lemoine; genuine.
3.00	.....	2.50	9.50	7.00	9.50	.....	20242	
6.72	2.40	2.23	11.35	9.12	10.50	3.50	35.17	
3.50	5.70	1.40	10.60	9.20	11.12	9.55	32.22	"
3.00	.....	2.00	9.00	7.00	9.00	.....	20243	
7.03	3.05	3.90	11.07	10.03	8.82	6.84	39.78	
5.00	3.84	3.19	12.03	9.44	8.54	5.88	31.50	Miss E. Davidson
5.12	2.40	1.80	7.00	6.00	10.00	.....	20244	
3.36	3.62	1.92	8.80	6.88	10.47	11.76	28.60	" "
7.56	2.07	1.26	11.00	9.00	2.00	.....	20245	
5.12	4.00	2.87	11.51	10.23	2.88	3.52	20.48	" "
11.99	9.12	9.12	29.90	20.23	2.62	11.36	19.36	" "
Trace.	6.07	20.31	26.38	8.07	1.98	7.52	24.78	20247
.....	14.39	11.19	25.58	14.39	.....	10.84	28.53	" "
Trace.	15.66	10.39	26.05	15.66	.....	8.75	27.50	20261
16.45	9.91	26.36	16.45	.....	.....	6.60	28.21	Miss S. E. Wright; genuine
Not registered.	.....	.....	.....	.....	.....	.....	.....	20305
13.76	6.23	19.99	13.76	.....	2.20	24.57	.....	"
7.35	2.73	7.67	17.75	10.08	1.36	11.66	23.41	20324
4.63	4.16	7.68	16.47	8.79	3.67	12.06	20.61	" deficient in ammonia.
5.00	.....	2.00	10.00	8.00	3.00	.....	20327	
7.52	2.24	2.71	12.47	9.76	3.44	13.92	22.06	
7.83	2.40	3.20	13.43	10.23	6.97	10.85	24.97	Miss S. E. Wright; genuine
14.55	4.00	18.55	14.55	.....	.....	.....	18.89	4325
13.60	6.23	19.88	13.60	.....	Trace.	19.32	.....	" "
4.92	0.84	1.91	7.82	.....	1.70	.....	4348	
1.59	4.17	1.72	7.48	5.76	3.71	9.30	19.21	
5.76	2.67	1.28	11.00	9.00	2.00	.....	4344	Alph. Lemoine; deficient in ammonia.
3.64	5.42	2.04	11.00	8.96	2.45	19.75	18.26	Alph. Lemoine; genuine.

TABLE II.—Results of the Examination of 84

Date of Collection.	No. of Sample.	NAME AND ADDRESS OF		Name or Brand of Fertilizer.	Nitrogen.	
		Vendor.	Manufacturer or Furnisher as given by Vendor.		Total including that of Nitric Acid or Ammonia if present.	Total calculated as Ammonia.
1903.						
April 23	4345 A.	Horne, Charlottetown, P.E.I.	Lowell Fertilizer Co., Boston, Mass.	Swift's Lowell Animal Fertilizer—	p. c.	p. c.
" 23	4346	Dominion Packing Co., Charlottetown, P.E.I.	Dominion Packing Co., Charlotteown, P.E.I.	Blood Fertilizer—	As guaranteed	3.00
" 23				Standard sample (1467)	2.78	3.38
" 23				Sample as sold	2.35	2.85
" 11	17855	Thomas Reid, Parish of Simonds, St. John Co., N.B.	Vendor	Superphosphate—	9.66	11.73
" 11				As guaranteed	8.90	10.81
" 13	17863	P. Nase & Son, Swift, Main St., John, N.B.	Lowell Fert. Co., Lowell, Mass.	Swift's Lowell Bone Fertilizer for Corn and Grain—	3.44	4.18
" 14	17868	Provincial Chem. Vendors, Fert. Co., Ltd., 89 Water St., St. John, N.B.		As guaranteed	4.11	4.99
" 14	17869	James Collins, 210 E. Frank Coe, New Union St., St. John.		Standard sample (1480)	1.84	2.23
" 14				Sample as sold	3.09	3.75
" 16	17876	W. B. McKay & Bowker Fert. Co., Main St., Sussex, N.B.	Boston.	Potato Phosphate—	As guaranteed	2.00
" 16				Standard sample (1375)	3.19	3.87
" 16				Sample as sold	3.93	4.77
" 17	17891	Toombs & Son, Main St., Moncton, N.B.	American Agricultural Chemical Co., Boston, Mass.	" Prize Brand" —	As guaranteed	0.84
" 17				Standard sample	0.84	1.02
" 17				Sample as sold	0.84	1.02
" 22	17901	Hugh McKenna, King St., St. Stephen, N.B.	Parmenter & Polsey Fertilizer Co., Penobscot, Maine.	" Farm and Garden" —	As guaranteed	2.00
" 22	17903	Henry E. Hill, King St., St. Stephen.	American Agricultural Chemical Co., New York.	Star Brand Superphosphate—	Standard sample (1442)	2.31
" 22				As guaranteed	1.90	2.31
" 22				Standard sample	1.68	2.04
" 23	17900	Small & Fisher Co., 131 Main St., Woodstock, N.B.	Provincial Chemical Co., St. John, N.B.	Soluble Pacific Guano—	As guaranteed	2.50
" 23				Standard sample (1401)	1.85	2.24
" 23				Sample as sold	2.39	2.91
" 22	17903	Henry E. Hill, King St., St. Stephen.	American Agricultural Chemical Co., New York.	Bradley's XL—	As guaranteed	1.39
" 22				Standard sample	2.06	2.50
" 22				Sample as sold	2.00	2.43
" 23	17900	Small & Fisher Co., 131 Main St., Woodstock, N.B.	Provincial Chemical Co., St. John, N.B.	Imperial—	As guaranteed	1.58
" 23				Standard sample (1376)	2.00	2.43
" 23				Sample as sold	1.58	1.92
" 25	17918	L. E. Cooper, Fredericton, N.B.	American Agricultural Chemical Co., New York.	Great Eastern, Hay and Oats—	As guaranteed	3.00
" 25				Standard sample (1363)	3.03	3.68
" 25				Sample as sold	1.69	2.06
" 20	23349	O. Fourrier, St. Alexandre, Ierville.	Bowker Fert. Co., Boston.	Corn Phosphate—	As guaranteed	0.77
" 20				Standard sample (1443)	0.46	0.56
" 20				Sample as sold	1.60	2.00
" 20				As guaranteed	1.75	1.94
" 20				Standard sample	1.75	2.12

Samples of Fertilizers as sold in 1903—*Continued.*

RESULTS OF ANALYSIS.							Relative value per ton of 2,000 lbs.	No. of Sample	Name of Analyst and Remarks.
Soluble in Water.	Citric Soluble.	In-soluble.	Total.	Total Available.	Potash.	Moisture.			
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	\$ cts.		
7.93	2.88	1.00	10.00	9.00	4.00	3.99	24.42	4345	
6.52	4.81	0.80	11.67	10.87	3.99	9.72	23.82		Alph. Lemoine; genuine.
1.91	1.91	13.24	11.33	3.84	10.20				
0.64	1.61	0.31	2.66	2.25	2.23	29.96	28.52	4346	
Trace.	1.39		1.59	1.59	0.77	37.35	23.92		" "
4.48	2.66	5.59	12.03	7.04	3.12	19.08	22.06	17855	
2.39	4.33	4.79	11.51	6.72	3.04	21.60	22.92		Miss E. Davidson; genuine
5.43	3.85	1.08	9.00	8.00	3.00			17863	
7.19	2.24	1.28	10.36	9.28	3.35	10.15	19.00		
			10.71	9.48	2.47	12.80	21.48		
6.71	1.63	4.77	13.11	8.34	5.23	10.00	25.05	17868	
7.83	1.77	3.83	13.43	9.60	5.07	7.76	28.04		" "
				Not registered under this name.					
8.15	2.09	4.15	14.39	10.24	2.64	12.80	18.26	17869	
5.76	3.68	1.59	10.00	8.00	2.00			17876	
6.88	2.39	3.04	11.03	9.44	2.10	10.48	18.58		
			12.31	9.27	4.44	17.75	20.83		Miss S. E. Wright; unadulterated.
5.00		2.00	10.00	8.00	1.50			17891	
7.68	1.75	2.88	12.31	9.43	1.85	14.00	19.74		
5.43	4.17	3.51	13.11	9.60	5.46	17.10	24.06		" "
				Not registered.				17901	
3.83	3.37	2.88	10.06	7.20	4.44	8.50	17.90		
5.00		2.00	10.00	8.00	1.50			17903	
6.07	2.62	2.50	11.19	8.69	1.60	13.80	17.79		" "
6.08	3.84	3.67	13.50	9.92	6.31	11.55	23.35		" "
7.36	2.73	7.67	17.75	10.08	1.50			17909	
6.23	1.93	7.99	16.15	8.16	2.23	14.10	18.83		
									Miss S. E. Wright; below guaranteed and standard.
6.00		1.00	12.00	11.00	2.00			17918	
11.19		2.88	14.07	11.19	6.24	10.90	21.04		
6.84	4.17	2.06	13.56	11.01	2.04	11.10	16.90		Alphonse Lemoine; unadulterated.
5.76	3.35	1.44	10.55	9.11	2.00	11.64	17.28	23349	
6.56	2.95	1.40	9.91	8.51	2.24	12.40	17.23		" "

TABLE II.—Results of the Examination of 84

NAME AND ADDRESS OF				Nitrogen.		
Date of Collection.	No. of Sample.	Vendor.	Manufacturer or Furnisher as given by Vendor.	Name or Brand of Fertilizer.	Total including that of Nitric Acid or Ammonia if present.	Total calculated as Ammonia.
1903.					p. c.	p. c.
April 20	23350	O. Fournier, St. Bowker Fert. Co., Alexandre, Iber-ville	Boston.	Potato and Vegetable Phosphate— As guaranteed Standard sample (1445)... Sample as sold...	2.00 2.36 2.05	
" 21	23352	A. Bergeron, Iber-ville.	"	Corn Phosphate— As guaranteed Standard sample (1443)... Sample as sold...	2.00 1.94 2.65	
" 21	23353	"	"	Potato and Vegetable Phosphate— As guaranteed Standard sample (1445)... Sample as sold...	2.00 2.36 2.36	
" 28	23370	H. R. Thompson, Americar. Agricultural Chemical Co., Ulverton.	Boston.	Bradley's Eclipse Phosphate— As guaranteed Standard sample (1403)... Sample as sold...	1.25 1.42 1.77	
" 28	23371	L. S. Plamondon, South Durham.	"	Bradley's Eclipse Phosphate— As guaranteed Standard sample (1403)... Sample as sold...	1.25 1.42 1.77	
" 28	23375	Richard Dunn, Bowker Fert. Co., South Durham.	Boston.	Bowker's Vermont Fertilizer— As guaranteed Standard sample (1439)... Sample as sold...	3.00 2.98 3.21	
" 30	23383	M. Ferland, Ber-thierville.	Nichol's Chemical Co., Capelton.	Victor Complete Fertilizer— As guaranteed Standard sample (1387)... Sample as sold...	2.00 3.07 3.02	
May 1	23384	S. Vessat & Co., Joliette.	"	Victor Fertilizer— As guaranteed Standard sample (1387)... Sample as sold...	2.00 3.07 1.17	
" 1	23385	"	"	Superphosphate— As guaranteed Standard sample (1388)... Sample as sold...	2.53 0.97 0.99	
April 7	21243	R. J. Latimer & Co., St. Maurice St., Montreal.	"	Victor Fertilizer— As guaranteed Standard sample (1387)... Sample as sold...	2.00 3.07 2.21	
" 7	21244	"	"	Royal Canadian Fertilizer— As guaranteed Standard sample (1386)... Sample as sold...	4.00 5.11 4.98	
" 7	21245	Brodie & Harvie, Standard Chemical and Fertilizer Co., Bleury St., Montreal.	Smith's Falls, Ont.	Standard Fertilizer— As guaranteed Standard sample (1419)... Sample as sold...	2.50 3.58 2.47	
" 7	21246	"	"	Special Fertilizer— As guaranteed Standard sample (1418)... Sample as sold...	3.50 4.78 3.54	

Samples of Fertilizers as sold in 1903—Continued.

RESULTS OF ANALYSIS.

Soluble in Water.	Phosphoric Acid.				Total Avail- able.	Potash.	Moist- ure.	Relative value per ton of 2,000 lbs.	Name of Analyst and Remarks.	No. of Samples
	Citric	In- soluble.	Total.	p. c.						
7.56	2.67	1.28	11.00	9.00	2.00	3.52	20.48	23350		
4.28	5.70	1.40	11.38	9.98	2.37	13.65	18.69	....	Miss S. E. Wright; un- adulterated.	
5.23	3.35	1.44	10.00	8.00	2.00	11.64	17.28	23352		
5.22	3.40	1.72	10.04	8.32	2.37	11.00	16.55	....	"	"
7.56	2.67	1.28	11.00	9.00	2.00	3.52	20.48	23353		
3.96	5.76	1.28	11.00	9.72	2.62	10.45	19.29	....	"	"
6.00	2.00	10.00	8.00	2.00	....	....	....	23370		
6.40	3.35	3.84	13.59	9.75	2.09	11.10	17.56	....	"	"
5.75	3.08	3.32	12.15	8.83	2.33	13.15	17.54	....	"	"
6.00	2.00	10.00	8.00	2.00	....	....	....	23371		
6.40	3.35	3.84	13.59	9.75	2.09	11.10	17.56	....	"	"
7.67	2.25	2.87	12.79	9.92	2.29	14.60	18.73	....	"	"
5.24	3.72	1.92	10.00	8.00	4.00	13.00	21.99	23375		
6.71	2.70	2.23	11.64	8.96	4.50	16.35	22.70	....	"	"
10.56	0.97	4.40	15.92	7.00	3.00	....	....	23383		
5.24	2.95	3.96	12.15	11.52	2.94	9.90	24.69	....	"	"
10.55	0.97	4.40	15.92	8.19	3.10	11.30	21.51	....	"	"
6.07	2.12	4.60	12.79	7.00	3.00	....	....	23384		
10.55	0.97	4.40	15.92	11.52	2.94	9.90	24.69	....	"	"
6.07	2.12	4.60	12.79	8.19	3.05	13.75	16.71	....	"	"
8.15	2.57	6.07	16.79	8.00	....	....	....	23385		
6.72	1.60	4.80	13.12	10.72	2.18	11.25	22.15	....	Miss E. Davidson; genuine.	
10.55	0.97	4.40	15.92	8.32	0.27	11.76	13.02	....	
5.03	1.73	4.59	11.35	7.00	3.00	....	....	21243		
8.95	0.14	3.83	12.92	11.52	2.94	9.90	24.69	....	Prof. J. T. Donald; accord- ing to guarantee.	
5.37	1.07	4.14	10.58	6.44	3.79	13.90	18.01	....	Prof. J. T. Donald; below guarantee in phosphoric acid.	
8.64	1.67	2.55	12.86	9.00	5.00	....	....	21244		
7.23	1.91	2.31	11.45	10.31	2.76	12.24	23.54	....	Prof. J. T. Donald; below guarantee in phosphoric acid.	
7.99	2.09	1.43	11.51	10.08	7.06	15.04	29.92	21245		
6.45	1.54	1.98	9.97	7.99	6.85	10.51	24.85	....	Prof. J. T. Donald; accord- ing to guarantee.	

TABLE II. -Results of the Examination of 84

NAME AND ADDRESS OF				Nitrogen.		
Date of Collection.	No. of Sample.	Vendor.	Manufacturer or Furnisher as given by Vendor.	Name of Brand of Fertilizer.	Total including that of Nitric Acid or Ammonia if present.	Total calculated as Ammonia.
1903.						
April 9	21247	Laing Pork Packing Co., Mill St., Montreal.	Vendors	Tankage Fertilizer— As guaranteed Standard sample (1394) Sample as sold	8.33 8.36 6.61	10.12 10.15 8.03
" 27	21248	Wm. Ewing & Co., Freeman Fert. Co., McGill Street, Montreal.	Freeman Fert. Co., McGill Street, Montreal.	Celery and Early Vegetable Manure— As guaranteed Standard sample (1427) Sample as sold	4.48 3.08	6.00 5.44 3.86
" 27	21249	"	"	Sure Growth— As guaranteed Standard sample (1425) Sample as sold	3.32 3.22	3.50 4.03 3.91
" 27	21250	"	"	Tankage— As guaranteed Standard sample (1431) Sample as sold	6.16 3.15	5.00 7.48 3.82
May 6	21251	Keddy & Kenny, Nichols Chemical Co., Hemmingford, P.Q.	Nichols Chemical Co., Hemmingford, P.Q.	Cape-ton Super-phosphate— As guaranteed Standard sample (1383) Sample as sold	2.09 0.70	2.53 0.86
" 6	21252	"	American Agricultural Chemical Co.	Eclipse (Bradley's)— As guaranteed Standard sample (1403) Sample as sold	1.03 1.10 1.48	1.25 1.42 1.80
April 21	23157	W. P. Peters, Brock St., Kingston.	Albert Thomas Phosphate Co.	Albert Thomas Phosphate— As guaranteed Standard sample (1396) Sample as sold . . . . .	.....	.....
" 21	23158	H. Brown & Son, King St., Brockville.	American Agricultural Chemical Co.	Potato Fertilizer— As guaranteed Standard sample (1405) Sample as sold	2.06 2.97 3.25	2.50 2.51 3.95
" 21	23159	"	"	New Method Fertilizer— As guaranteed Standard sample (1406) Sample as sold	1.03 1.22 2.31	1.25 1.47 2.81
" 21	23160	"	"	B. D. Seafowl Guano— As guaranteed Standard sample (1437) Sample as sold	2.06 2.78 2.40	2.50 3.38 2.91
" 21	23161	A. E. Cameron, Brockville.	Nichols Chemical Co.	Victor Fertilizer— As guaranteed Standard sample (1387) Sample as sold	2.53 2.76	2.00 3.07 3.35
" 21	23162	"	"	Royal Canadian— As guaranteed Standard sample (1386) Sample as sold	4.21 3.38	4.00 5.11 4.10
" 22	23163	R. W. Ross & Co., Read Fert. Co., Prescott, Ont.	Read Fert. Co., Prescott, Ont.	Vegetable and Vine— As guaranteed Sample as sold	1.67	2.03
" 22	23164	"	"	Farmer's Friend— As guaranteed Sample as sold	1.55	1.88

Samples of Fertilizers as sold in 1903 - *Continued.*

RESULTS OF ANALYSIS.

Phosphoric Acid.							Relative value per ton of 2,000 lbs.	Name of Analyst and Remarks.
Soluble in Water.	Citric Soluble.	In-soluble.	Total.	Total Available.	Potash.	Moisture.		
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	\$ cts.	
1.28	6.88	1.75	9.40	9.91	8.16	0.27	11.96	29.97
0.35	10.50	2.57	13.42	10.85	0.15	13.18	28.76	21247 Prof. J. T. Donald : above guarantee in phosphoric acid ; below in ammonia.
3.83	2.89	3.83	9.00	10.55	6.72	6.83	11.72	27.75
2.36	6.88	3.71	12.96	9.24	7.24	11.64	27.12	21248 Prof. J. T. Donald ; below guarantee in ammonia.
3.32	3.72	4.47	8.00	11.51	7.04	3.14	14.50	21.34
3.00	2.17	4.81	9.99	5.17	2.70	10.85	18.63	21249 Prof. J. T. Donald ; according to guarantee.
0.63	11.68	3.99	12.00	16.30	12.31	4.68	29.59	21250
2.56	4.79	5.20	12.55	7.35	2.68	11.57	20.27	Prof. J. T. Donald ; below guarantee in ammonia.
8.15	2.57	6.07	8.00	16.79	10.72	2.18	11.26	22.15
5.61	0.68	6.03	8.00	12.32	6.29	0.15	11.41	11.27
6.00	2.00	10.00	8.00	2.00	2.00	2.00	2.00	21251 Prof. J. T. Donald ; below guarantee in available phosphoric acid.
6.40	3.35	3.94	13.59	9.75	2.09	11.10	17.56	21252 Prof. J. T. Donald ; according to guarantee.
5.03	4.02	2.94	11.99	9.03	1.92	10.65	17.21	23187 Prof. E. B. Kenrick ; genuine.
14.55	4.00	18.55	14.55	13.95	0.20	18.80	18.48	23158
13.95	4.48	18.43	13.95	13.95	2.70	18.48	18.48	" "
5.00	2.00	10.00	8.00	3.00	3.00	3.00	3.00	23159
6.07	1.39	2.23	10.23	9.00	3.18	13.96	18.46	23160
5.92	1.72	2.91	10.55	7.64	2.45	10.93	20.38	" "
6.00	2.00	10.00	8.00	2.00	2.00	2.00	2.00	23161
6.07	1.48	2.87	10.42	7.55	2.14	13.55	15.18	23162
6.23	2.69	1.38	10.30	8.92	1.97	9.85	18.98	Prof. E. B. Kenrick genuine.
6.00	1.00	9.00	8.00	1.50	1.50	1.50	1.50	23163
6.07	2.76	2.11	10.94	8.83	1.62	14.65	19.88	Prof. E. P. Kenrick.
5.81	3.37	2.51	11.69	9.18	1.83	11.48	19.56	" "
10.55	0.97	4.40	7.00	15.92	11.52	2.94	9.90	24.69
4.80	1.02	5.46	11.28	5.82	3.15	10.00	19.01	" "
8.95	0.14	3.83	9.00	12.92	8.91	5.47	7.06	29.28
4.72	1.54	5.02	9.00	11.28	6.26	7.61	7.94	25.64
7.08	2.81	3.17	13.06	9.89	3.81	10.92	20.57	23164
Not registered under this name.								
5.95	2.96	3.50	11.41					
Not registered under this name.								
7.08	2.81	3.17	13.06					

TABLE II. - Results of the Examination of 84

NAME AND ADDRESS OF				Name or Brand of Fertilizer.	Nitrogen.	
Date of Collection.	No. of Samples.	Vendor.	Manufacturer or Furnisher as given by Vendor.		Total including that of Nitric Acid or Ammonia if present.	Total calculated as Ammonia.
1903.						
" 22	23165	R. W. Ross & Co., Prescott, Ont.	Read Fert. Co.,	Standard— As guaranteed..... Standard sample (1408)..... Sample as sold.....	0.82 1.19 1.12	1.00 1.45 1.36
" 22	23166	"	"	Potato Special— As guaranteed..... Standard sample (1409)..... Sample as sold.....	0.82 1.06 1.12	1.00 1.29 1.36
" 18	23109	Titterington & Co., King Street, St. Catharines, Ont.	American Agricultural Chemical Co.	Special No. 1..... Sample as sold.....	1.90	2.31
" 18	23110	"	"	Complete Manure— As guaranteed..... Standard sample (1438)..... Sample as sold.....	3.29 4.14 2.89	4.00 5.03 3.51
" 18	23111	"	"	Potato Fertilizer— As guaranteed..... Standard sample (1405)..... Sample as sold.....	2.06 2.07 2.13	2.50 2.51 2.58
" 18	23112	"	"	Seafowl Guano— As guaranteed..... Standard sample (1437)..... Sample as sold.....	2.06 2.78 3.49	2.50 3.38 4.23
" 18	23113	R. R. Gage, St. Catherines, Ont.	Freeman Fert. Co., Hamilton.	Sure Growth— As guaranteed..... Standard sample (1425)..... Sample as sold.....	3.32 2.66	3.50 3.23
April 18	23114	R. R. Gage, St. Catherines, Ont.	Freeman Fert. Co., Hamilton.	Potato Manure— As guaranteed..... Standard sample (1430)..... Sample as sold.....	2.95 2.68	3.00 3.58 3.26
" 16	23441	Wm. Taylor, Bar- rie, Ont.	"	Bone Meal— As guaranteed..... Standard sample (1433)..... Sample as sold.....	3.50 5.08	4.25 6.17
" 16	23442	Wm. Taylor, Bar- rie, Ont.	Imported.	Thomas Phosphate Powder— As guaranteed..... Standard sample (1396)..... Sample as sold.....	.....	.....
" 17	23443	J. A. Bruce & Co., King St., Ham- ilton.	American Agricultural Co., N. Y.	Bone Dust— As guaranteed..... Standard sample (1407)..... Sample as sold.....	2.50 2.78 2.24	3.00 3.38 2.72
" 17	23444	"	G. C. Watson, Phil- adelphia.	Peruvian Guano Flower Fer- tiliser. Sample as sold.....	..... 2.10	..... 2.56
" 16	22068	Halmann & Co., Armour & Co., Chi- Berlin.	.....	Meatmeal Fertilizer..... Sample as sold.....	..... 3.44	..... 10.25
" 17	22073	Struther & Church, Galt.	.....	Thomas Phosphate Fertilizer— As guaranteed..... Standard sample (1396)..... Sample as sold.....	..... ..... .....	..... ..... .....
" 21	22083	Morton & Christy, Windsor, Ont.	Michigan Carbon Works, U.S.	Fertiliser..... Sample as sold.....	2.84	3.46

Samples of Fertilizers as sold in 1903—“*included.*

RESULTS OF ANALYSIS.

Phosphoric Acid.						Potash.	Moisture.	Relative value per ton of 2,000 lbs.	No. of Sample.	Name of Analyst and Remarks.
Soluble in Water.	Citric Soluble.	In-soluble.	Total.	Total Available.	p. c.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	\$ cts.		
5.00		2.00	10.00	8.00	4.00				23165	
5.11	4.17	3.35	12.63	9.28	4.48	12.16	19.51			
6.33	2.53	2.13	10.99	8.86	4.27	9.72	18.41			
2.00		1.00	5.00	4.00	8.00				23166	
3.99	2.41	2.07	8.47	6.40	8.69	6.04	19.96			
2.81	1.70	1.74	6.05	4.31	8.03	7.10	16.86			
Not registered under this name.									23109	
6.24	2.44	3.35	11.83	8.48	7.87	10.16	24.32			Miss E. Davidson.
6.00		1.00	9.00	8.00	7.00				23110	
5.75	2.89	2.55	11.19	8.64	7.10	9.35	29.30			
5.28	4.62	3.36	13.26	9.90	9.10	8.00	29.49			Miss E. Davidson; unadulterated.
5.00		2.00	10.00	8.00	8.00				23111	
6.07	1.39	2.23	10.23	9.00	3.48	13.96	18.46			
6.88	3.04	1.75	11.67	9.92	6.36	11.06	24.34			
6.00		1.00	9.00	8.00	1.50				23112	
6.07	2.76	2.11	10.94	8.88	1.62	14.65	19.88			
3.36	4.47	4.00	11.88	7.83	2.62	9.60	21.97			
3.32	3.72	4.47	11.51	7.04	3.14	14.50	21.34		23113	
4.48	2.88	5.43	12.79	7.36	3.98	12.76	21.28			
			8.00		3.00					
4.31	3.53	4.79	12.63	7.84	7.54	13.16	26.08		23114	
4.79	3.86	5.75	14.20	8.45	3.14	13.60	21.77			Alph. Lemoine; deficient in potash.
None.	13.24	13.56	28.80	13.24	None.	6.90	27.13		23441	
0.70	11.90	8.31	20.90	12.59		6.65	28.60			Alph. Lemoine; genuine.
	14.66	4.00	18.66	14.55		0.20	18.80		23442	
	12.90	5.75	18.55	12.80		Trace.	18.10			Alph. Lemoine; deficient in available phosphoric acid.
Trace.	14.40	9.27	21.67	14.40		4.25	26.20		23443	
2.87	12.49	6.07	21.43	15.36	5.46	5.45				Alph. Lemoine; unadulterated.
Not registered.									23444	
15.36	10.55	25.91	15.36	Trace.	5.00					Alph. Lemoine.
Not registered.									22088	
0.50	0.01	0.96	1.47	0.51	2.29	4.30				"
	14.56	4.00	18.55	14.55		0.20	18.80		22073	
	14.30	5.20	19.50	14.30		Trace.	19.57			"
Not registered.									22083	
3.00	3.16	1.00	7.16	6.16	6.19	9.06				genuine.

TABLE II.—Results of the Examination of 84

Date of Collection.	No. of Sample.	NAME AND ADDRESS OF		Name or Brand of Fertilizer.	Nitrogen.	
		Vendor.	Manufacturer or Furnisher as given by Vendor.		Total, including that of Nitric Acid or Ammonia if present.	Total calculated as Ammonia.
1908.	.....				p. c.	p. c.
April 21	22085	John Geddes, Windsor.	R. Evans, Hamilton.	Ground Bone— As guaranteed. Standard sample (1407). Sample as sold.	2.50 2.78 2.71	3.00 3.36 3.29
" 23	22088	Darch & Hunter, London.	Michigan Carbon Works.	Bonemeal Fertilizer— As guaranteed Standard sample (1474). Sample as sold.	1.27 1.91	1.50 1.54 2.31
" 23	22085	A. Molinnis, London.	John McMeghan, Soap Manufacturer.	Crown Jewel Fertilizer. Sample as sold.	8.35	10.14
" 23	22100	Ingersoll Packing Co., Ingersoll.	Vendor	Ingersoll Fertilizer— As guaranteed Standard sample (1434). Sample as sold.	7.92 8.00	9.00 8.40 9.72
" 24	22105	J. H. McMeghan, London.	London Soap Co., London.	Tankage— As guaranteed Standard sample (1435). Sample as sold.	9.21 8.19	11.18 9.94
" 26	22106	G. Carter & Son, St. Mary's.	Thomas Phosphate Co., England.	Thomas Phosphate Fertilizer— As guaranteed Standard sample (1396). Sample as sold.	.....	.....
" 23	23327	M. J. Henry, Vancouver, B.C.	Imported.	Bone Meal— Standard sample (1463). Sample as sold.	2.98 4.56	3.62 5.56
" 23	23528	"	Victoria Chemical Co.	Nitrate of Soda— As guaranteed. Standard sample (1480). Sample as sold.	16.00 15.93 15.94	19.36 19.36
" 23	23529	"	"	Sulphate of Potash— As guaranteed Standard sample (1478). Sample as sold.	.....	.....
" 23	23530	"	"	Muriate of Potash— As guaranteed. Standard sample (1476). Sample as sold.	.....	.....
" 24	23531	C. Nelson, Vancouver, B.C.	"	Fertilizer B— As guaranteed Standard sample (1483). Sample as sold.	3.50 3.79 3.14	3.38 3.38 3.81
" 26	23536	Victoria Chemical Co., Victoria, B.C.	Vendors.	Superphosphate— As guaranteed. Standard sample (1481). Sample as sold.	Trace. 9.50	Trace. 0.71
" 25	23537	"	"	Fertilizer "A"— As guaranteed. Standard sample (1482). Sample as sold.	4.00 3.45 3.00	4.20 4.20 3.63
" 25	23538	"	"	Fertilizer "B"— As guaranteed. Standard sample (1463). Sample as sold.	3.50 2.79 3.30	3.36 3.36 4.00

Samples of Fertilizers as sold in 1803—Continued.

RESULTS OF ANALYSIS.							Relative value per ton of 2,000 lbs.	No. of Sample.	Name of Analyst and Remarks.
Phosphoric Acid.					Potash.	Muri-			
Soluble in Water.	Citric Soluble.	In-soluble.	Total.	Total Available.		ure.			
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	8 cts.		
Trace.	14.40	9.27	21.00	14.40	.....	4.26	26.29	22065	
Trace.	15.33	9.27	23.67	15.33	Trace.	5.10	26.11	.....	Alph. Lemoine; genuine.
None.	17.01	15.09	25.00	17.01	Trace.	2.75	26.56	22066	
.....	18.85	13.43	31.98	18.85	.....	3.06	25.31	.....	Miss E. Davidson; genuine.
Not regi-	.....	.....	.....	.....	.....	.....	.....	22066	
3.06	2.57	2.71	7.36	4.65	0.50	6.64	.....	.....	"
.....	.....	.....	6.80	.....	.....	8.00	.....	22100	
Trace.	11.84	2.36	14.20	11.84	0.30	15.12	32.94	.....
Trace.	10.24	2.30	12.03	10.24	0.44	13.06	31.06	.....	unadul-
.....	.....	.....	.....	.....	.....	.....	.....	22106	terated.
Trace.	1.27	2.23	3.00	1.27	0.30	11.75	26.33	.....
Trace.	4.96	1.76	6.72	4.96	0.39	6.08	26.99	.....	"
.....	.....	.....	.....	.....	.....	.....	.....	22106	"
.....	14.55	4.00	18.55	14.55	.....	0.20	18.80	22106	
.....	13.27	4.32	17.59	13.27	.....	6.64	17.62	.....	"
Trace.	15.66	10.39	26.05	0.66	None.	8.75	27.50	23537	
.....	15.00	9.50	24.50	15.00	.....	6.20	30.20	.....	Dr. C. J. Fagan; genuine.
.....	.....	.....	.....	.....	.....	0.66	41.42	22626	
.....	.....	.....	.....	.....	.....	1.76	41.44	.....	"
.....	.....	.....	.....	.....	53.00	.....	.....	22629	
.....	.....	.....	.....	.....	58.46	6.00	56.13	.....
.....	.....	.....	.....	.....	50.30	2.22	52.81	.....	"
.....	.....	.....	.....	.....	53.00	.....	.....	22630	
.....	.....	.....	.....	.....	55.58	0.13	56.36	.....
.....	.....	.....	.....	.....	56.87	2.44	59.69	.....	"
10.23	1.60	.....	9.00	11.83	11.00	.....	.....	22631	
10.80	0.50	0.50	11.83	11.83	12.03	9.40	33.92	.....
.....	.....	.....	.....	.....	13.96	7.22	36.48	.....	"
16.12	2.56	0.64	19.32	18.68	.....	12.70	22.35	22636	
16.00	0.30	0.30	16.00	16.30	None.	14.50	44.55	.....	"
.....	.....	.....	10.00	.....	.....	7.00	.....	22637	
10.55	0.98	0.64	12.15	11.61	7.51	10.07	36.76	.....
10.40	0.30	0.30	11.00	10.70	11.81	12.16	33.10	.....	but very
10.23	1.60	0.25	11.83	11.83	12.03	9.40	33.92	22638	badly mixed, large lumps
9.80	0.30	0.25	10.15	9.80	12.00	13.20	33.10	.....	of nitrate of potash being present.
.....	.....	.....	9.00	.....	11.00	.....	.....	Dr. C. J. Fagan; genuine,	
.....	.....	.....	.....	.....	.....	.....	.....	but badly mixed.	

TABLE II.—Results of the Examination of 84

Date of Collection.	No. of Sample.	NAME AND ADDRESS OF		Name or Brand of Fertilizer.	Nitrogen.	
		Vendor.	Manufacturer or Furnisher as given by Vendor.		Total includ- ing that of Nitric Acid or Am- monia if present.	Total calculat- ed as Am- monia.
1903.					p. c.	p. c.
April 25	23539	Victoria Chemical Co., Victoria, B.C.	Vendor.....	Fertilizer "C" As guaranteed..... Standard sample (1484)		
" 25	23540	"	"	Sample as sold..... Thomas Phosphate As guaranteed..... Standard sample (1479)	0.75	0.91
				Sample as sold	None.	None.

Samples of Fertilizers as sold in 1903—Concluded.

RESULTS OF ANALYSIS.							Relative value per ton of 2,000 lbs.	No. of Sample	Name of Analyst and Remarks.
Phosphoric Acid.					Potash.	Moisture.			
Soluble in Water.	Citric Soluble.	In-soluble.	Total.	Total Available.					
p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	\$ cts.		
14·52	1·47	.....	12·50	.....	11·00	9·10	31·18	23539	
13·10	0·40	0·30	13·80	13·50	11·56	12·56	30·20	.....	Dr. C. J. Fagan; genuine but badly mixed.
.....	12·47	4·31	16·78	12·47	.....	0·04	16·74	23540	
None.	11·40	3·00	15·00	11·40	None.	0·28	15·06	.....	Dr. C. J. Fagan; genuine.

MEMORANDA ON MANURES.

Since this publication is intended for circulation among our farmers, it has been thought advisable to take advantage of its issue by reprinting some of the notes which have appeared in former bulletins, and adding a few additional particulars from works which have recently appeared, regarding the application of natural manures and artificial fertilizers.

It is about fifty years since Stoerckhardt, at that time professor in the agricultural school of Tharandt, Saxony, said that a farmer who bought guano, bonemeal, or other artificial fertilizers, and at the same time neglected to make proper use of the dung of the cattle on his own farm, must be regarded as an agricultural spendthrift. Every intelligent farmer in Canada will in these modern days agree with the old German professor, and maintain that the treasury of the farm is the dungstead, and that leaks and emanations from it of valuable fertilizing constituents must lead to financial embarrassment and possibly ruin.

This statement may be positively made without in the slightest degree detracting from the merits of artificial fertilizers, for when properly selected and applied, their value becomes abundantly evident. The question as to whether their use is remunerative has been frequently discussed, and depends to a large extent on the care employed in their selection. Supposing that the intelligent farmer has considered composition, cost, &c., to the best of his ability, made his selection and applied the fertilizer, he may still be in doubt as regards the result unless he takes steps to make a manure trial with it. As regards the best way of doing this, Hellriegel, in a publication, dated 1897, has related his experience. He recognized how difficult it is for practical agriculturists, fully occupied with their regular work, and engaged in meeting all the difficulties caused by workmen, weather and market rates, to carry out regularly planned manure experiments. He therefore describes a method which experience in his estimation had justified, and recommends it for the purpose of ascertaining whether any application of lime, marl, dung or fertilizers had really produced the improvement which from the point of view of cost had been expected. This plan is to pass over, at one or several places, properly selected, a few square rods of the field without applying the dung or fertilizer. In this way unmanured plots, which do not require to be measured with great exactitude, but merely paced, and do not need to be harvested separately, are left in the manured field, by means of which any improvement in the latter may be remarked and valued.

This plan exacts that it should be possible to *see* a distinct difference between the unmanured plots and the manured field, not only as regards the height and density of the resulting crop, but also in reference to the fullness of the ears and the development of the grains. In the event of such a distinct difference being invisible the manure is justly discredited as unfit for its intended purpose. It would seem advisable to recommend this plan to farmers who use fertilizers, because some of them may manure the whole field, fail to see any improvement on account of being unable to make comparisons, and perhaps condemn the fertilizer unjustly. The simplicity of the plan above described, and its applicability everywhere and every year would appear to commend it to the practical agriculturist. At the same time it is necessary to remark that there are instances on record of fertilizers having been applied and remaining utterly without effect owing to some defect in the soil. Such defects have often been cured by a previous application of marl or lime, which not only produced good effects themselves, but improved also the action of the fertilizers afterwards applied.

THE CARE OF NITROGEN.

This element is the most valuable of fertilizing constituents, and one which is exceedingly liable to loss.

In many of the fertilizers described in this and former reports their cost is very much increased by the admixture of nitrogenous constituents. This cost farmers might save by properly caring for the stock of nitrogen on their farms, and this stock might even be increased by cultivating those crops which have the power of appropriating the

nitrogen of the atmosphere. Nevertheless the fertilizer manufacturers still seem to be under the necessity of supplying this element in considerable quantity in their goods, and of charging for it. In the case of the mixed fertilizers, this extra charge varies from \$8 to \$14 per ton, which the farmer must pay if he purchases, and which he can readily save in his own stables or produce upon his own farm.

Nearly the whole of the nitrogen in the fodder fed to farm stock is to be found in the excreta of the animals, and one-half of it is contained in the urine. It is further well known that 95 per cent of the potash contained in the food of cattle and sheep may be recovered by carefully saving the liquid manure only. It has, however, been ascertained that stable-yard manure experiences considerable loss of its fertilizing constituents, but more especially of nitrogen, when left to itself in the dung heap. According to the experiments of Wolff, this loss amounts to 55 per cent of the nitrogen contained in fresh manure from horned cattle. The later experiments of Heiden and Holdefleiss place it at 23·4 per cent. These results were obtained when ordinary reasonable care is taken of the manure, but give no data for estimating the loss which occurs when, as is very frequently the case in Canada, the manure is treated with the greatest neglect. It is safe to assume that, generally, 50 per cent of the nitrogen contained in the barn-yard manure of this country returns unutilized to the atmosphere, or is otherwise lost by careless treatment. Supposing that an average quantity of 36,000 pounds is produced in fresh condition annually by each animal, and that it contains 0·4 per cent of nitrogen, it follows that a loss of 72 pounds of nitrogen, worth \$8.64, takes place for each head of cattle. This loss can be prevented by daily strewing the stables with two pounds of ground plaster for each animal, which at once prevents any smell of ammonia from arising in the stable. The quantity prescribed means 700 lbs. or a cost of about \$2.50 annually for each 1,000 lbs. live weight, but, by adopting this plan, the farmer would to a great extent be relieved from the necessity of purchasing the nitrogen of artificial fertilizers.

In a pamphlet published by Vieweg, 1859, entitled *Ein Pfund Stickstoff kaum einen Groschen*, which may be freely translated 'A pound of nitrogen for a penny,' Dr. Meyer Altenberg maintained that ground gypsum is the very best preservative of barn-yard manure when applied in the stable, because it secures 'certainty and completeness of effect, ease of execution, and the lowest possible cost.' He further described the effect of its application on the domain of Beberbeck in Hesse, and other impoverished farms, showing that it is possible to bring such into a fertile condition without the purchase of manure or fertilizers or feeding stuffs, excepting a little straw for bedding and oats for the horses.

TREATMENT OF STABLE-YARD MANURE.

Dr. Meyer-Altenberg, in the little work above mentioned, takes care to point out that the use of gypsum, without subsequent careful treatment of the dungheaps, does not give the desired effect, and he dwells on the importance of having the manure thoroughly trodden down, and made as compact as possible. This is also shown in Dr. J. Koénig's prize essay, 'How can the farmer preserve and increase the stock of nitrogen on his property?' (Berlin, 1887.) In a special chapter of this work the author discusses 'The evolution of free nitrogen during the fermentation and storage of stable manure,' describes the experiments which were made from 1860 to 1885 regarding its treatment, and gives, finally, the results of the discussion from which the following sentences may be translated with advantage:—

1. In the decomposition of nitrogenous substances of every nature a loss, more or less considerable, of free nitrogen takes place.
2. This loss is the greater the more the atmosphere has access to the decomposing mass.
3. Too much moisture is just as hurtful as too little. Stable manure require such a degree of humidity as permits its components to lie close to each other.
4. The addition of substances which fix ammonia (such as gypsum, kainite and kieserite) prevent or reduce the loss of nitrogen. *These substances are, however, of little*

or no value if care is not taken at the same time to prevent as much as possible the access of air.

12. In storing stable manure in dungsteads the latter must be watertight and roofed in, and the treading down of their contents by the farm animals is to be recommended.

One thing in connection with this question is perfectly certain and that is that the use of gypsum, or ordinary ground land plaster, prevents any loss of nitrogen in the stable, and while the manure is being forwarded to the dungheap. Further, if the work from which the foregoing quotations have been made be carefully studied, and also the experiments and writings of Holdefleiss, Vogel and others, it appears to be quite certain that the use of the same article, or of the gypsum produced in the manufacture of 'acid-phosphate,' completely prevents the loss of ammonia from the liquid part of the manure, and also from the organic nitrogen of the solids, provided the whole has, previous to fermentation, been made thoroughly compact, and atmospheric air almost completely excluded. Where it is found impossible to attend to the latter precautions, the safest way will probably be found to lie in avoiding fermentation altogether, by conveying the fresh manure, after treatment with gypsum, on to the field to be manured and bringing it under the soil as rapidly as possible. The latter practice has been proved to be most advantageous by the experiments which have been carried on for some time past, at the Central Experimental Farm by Director Saunders. (See Reports for 1898.)

Not only has the addition of substances which have the faculty of fixing ammonia been recommended for stable manure, but its improvement to a greater extent has been proposed by the addition of fertilizers. The following quotation is taken from Bulletin No. 45 (for March, 1897) of the Massachusetts Agricultural College, and was written by Dr. C. A. Goessmann, Chemist for that institution :—

'The practice of adding to the manurial refuse materials of the farm as stable manure, vegetable compost, &c., such single commercial munurial substances as will enrich them in the direction desirable for any particular crop to be raised, does not yet receive that degree of general attention which it deserves.' (The italics are in the original.) An addition of potash in the form of muriate or sulphate of potash, or of phosphoric acid in the form of fine ground South Carolina or Florida soft phosphate, &c., will in many instances not only improve their general fitness as complete manure, but quite frequently permit a material reduction in the amount of barn-yard manure ordinarily considered sufficient to secure satisfactory results.'

'Average composition of seventy-five samples of barn-yard manure :—

	Per cent.	Lbs. per ton.
Moisture.....	67·00	1,340·0
Nitrogen.....	0·52	10·4
Potassium oxide.....	0·56	11·2
Phosphoric acid	0·39	7·8

The average barn-yard manure contains, it will be noticed from the above statement, a larger percentage of nitrogen, as compared with its potash and phosphoric acid than is generally considered economical. An addition of from thirty to forty pounds of muriate of potash, and of one hundred pounds of fine ground natural phosphate (soft Florida or South Carolina floats) per ton of barn-yard manure would greatly increase its value as an efficient and economical general fertilizer.'

These are no doubt most excellent suggestions, and there is no reason why these substances should not be introduced into the stable manure in the same manner as in the case of the ground plaster above mentioned. Plain superphosphate and kainite might also be used, some of the constituents which would be useful in fixing the ammonia, as soon as formed from the organic nitrogen. Should this suggestion be found to have practical value, there is no doubt that our fertilizer manufacturers would be found able to supply our farmers, at a moderate cost, with a mixture of ground plaster, superphosphate and kainite, in such proportions as experience might show to be most advantageous. No better application can be made of the wood ashes produced in the

farmer's household than by mixing them with the barn-yard manure, and most excellent results are known to have followed this practice.

ACQUISITION OF NITROGEN.

Not only can the farmer save almost the whole of the nitrogen contained in the fodder fed to his cattle, but he can actually increase the stock of it stored away in his fields, agricultural products and manure heaps, by a judicious course of crop rotation. For more than a century agricultural chemists have discussed the question as to whether free atmospheric nitrogen can be assimilated by plants, but it may now be regarded as perfectly settled in the affirmative, if regard is had only to the plants of the order leguminosæ, such as beans, peas, lentils, vetches, clovers, alfalfa, serratella, &c. Even the great English agriculturists, Sir J. J. Lawes and Sir Henry Gilbert, who had previously been of an opposite opinion, have now admitted that this appropriation of nitrogen has been completely proved. This acknowledgment was made by Sir Henry Gilbert, at a great meeting of agricultural chemists held at Halle, in Germany, in September, 1891. Thus, modern research has confirmed not only modern agricultural practice, but also the experience of antiquity, for Prof. W. Strecker has pointed out a passage in Pliny which says: 'Lupines require so little manure that they, in fact, replace it; vetches make the land more fertile. Corn should be sown where previously lupines or vetches have stood, because they enrich the land.'

It is not, however, to be supposed that this utilization of atmospheric nitrogen by leguminous plants can take place upon very poor soils or upon those destitute of the inorganic constituents which they require. The latter must in such cases be supplied in the shape of potash with some phosphoric acid, as was done with great success by Schultz, of Lupitz, a practical agriculturist in North Germany. In fact, had it not been for his investigations, the controversy above referred to might have continued without results up to the present hour.

Professor König, of Münster, gives the following summary of Schultz's experience:—

'Schultz acquired the farm Lupitz in the year 1855: its soil consisted of a poor, cold diluvial sand; the profit in working it was very small. Lupines yielded, indeed, as a fodder tolerable results, but when used as green manuring for rye and oats, no return was obtained from them. The application of artificial manures produced good crops, but they did not pay; burnt lime showed itself to be too heating. The use of manure was more favourable, especially when fertilizers containing phosphoric acid were used at the same time. But at the best the total result was not satisfactory.'

'Shortly after Schultz acquired Lupitz, the great discovery of potash salts was made, and about 1860 they began to be produced from the mines of Stassfurth. Schultz made up his mind to try them as manure and he obtained the most surprising results. After lupines had shown themselves to be useless as forerunners of grain, they were excluded from the rotation and grown on a separate field without any manuring and alternating with sheep pasture. But the harvest on these became worse and worse until the field in question became quite lupine "sick." Schultz made his first trial on this field, manuring it with 300 pounds kainite per morgen (1 Prussian morgen = 0.631 acre); the sickness was at once cured, and for twenty-five years afterward. Schultz has grown lupines on this ground without interruption, always with the application of 300 pounds kainite. Schultz obtained similar good results on the ground which had received the marl, by the application of potash salts. This ground had indeed yielded well with lupines for two years after the application of the marl, but in the third year they sickened here too. When, however, 300 pounds kainite were applied here and ploughed in, the ground was cured, although an application of phosphate had not produced the desired results.'

'The favourable influence which the manuring with kainite or potash salts had exerted on lupines induced Schultz to try them on grain, in conjunction with phosphates. But in this case he obtained contradictory results, according to the nature of the crops which preceded the grain. For instance, while grain sowed after lupines and manured with potash and phosphates yielded very good and remunerative harvests, these were not

to be obtained if grain was grown after grain or after potatoes. This behaviour of these crops was explained by Schultz in this way : that lupines or deep-rooted plants leave in the soil after harvest a residue of root, in which a considerable amount of nitrogen has accumulated, an amount sufficient to supply the wants of the following grain crops ; that, on the other hand, the application of potash and phosphates, to grain, after a preceding grain crop, is without effect, for the reason that the latter has consumed the stock of nitrogen. Grain crops always reduce this stock ; never increase it. Schultz has given the name of "nitrogen collectors" to the lupines and similar plants, while grains are called "nitrogen consumers." His system of rotation is therefore the following :—Sow first nitrogen collectors (lupines, peas, beans, vetches, clover, lucerne, serratella, &c.), or, as they have been called, renovating crops, and give them 300 pounds kainite per morgen, with perhaps an addition 20 pounds phosphoric acid. After harvesting the nitrogen collectors, sow a nitrogen consumer, raising a grain or exhausting crop, giving it also 300 pounds kainite and 20 pounds phosphoric acid. The grain crop is perfectly successful, because the first crop left behind it nitrogen enough to supply the wants of the grain. In this way the keeping of stock, which is expensive on a poor sandy soil, can be reduced and the purchase of nitrogenous fertilizers dispensed with, because the nitrogen collectors are able to stock the soil with that valuable element.'

The foregoing description is taken from Professor König's 'Stickstoff Vorrath,' published in 1887 (Paul Parey, Berlin). It was in 1884, nearly thirty years after the purchase of his sandy farm, that Schultz, of Lupitz, published the results of his experience, although they did not contain anything very new and although they only confirmed experiences still older than his own. But his case was surprising and his explanation of the cause of his successful farming challenged the attention of scientific agriculturists. The consequence has been the issue of many pamphlets on the subject, and an activity in the region of agricultural experimenting which is not yet ended. Atwater, Wagner, Heiden, Hellriegel and many others have participated in these investigations, and Professor Wood, of the Storrs Agricultural School in Connecticut, has given the following general conclusions as the result of the work :—

1. 'Pease, alfalfa, serratella, lupine, clover in all probability, and apparently leguminous plants in general, are able to acquire large quantities of nitrogen from the air during their period of growth.'

2. 'There is scarcely room to doubt that the free nitrogen of the air is thus acquired by plants.'

3. 'That is a connection between root tubercles and this acquisition of nitrogen is clearly demonstrated. What this connection is, what are the relations of micro-organisms to the root tubercles and the acquisition of nitrogen, and in general how the nitrogen is obtained are questions still to be solved.'

4. 'The cereals with which the experiments have been completed have not manifested this power of acquiring nitrogen, nor do they have such tubercles as are found on the roots of legumes.'

5. 'In the experiments here reported, the addition of soil infusions did not seem necessary for the production of root tubercles. A plausible supposition is that the micro-organisms or their spores were floating in the air and were deposited in the pots in which the plants grew.'

6. 'As a rule the greater the abundance of root tubercles in these experiments, the larger and more vigorous were the plants and the greater was the gain of nitrogen from the air.'

7. 'In a number of these experiments, as in similar ones previously reported, there was a loss of nitrogen instead of gain. The loss occurred where there were no root tubercles ; it was especially large with oat plants, and largest where they had the most nitrogen at their disposal in the form of nitrates. As the gain of nitrogen by the legumes helps explain why they act as renovating crops, the loss in the case of the oats suggests a possible reason why they should appear to be an exhausting crop.'

'Practical inferences :—The ability of legumes to gather nitrogen from the air helps to explain the usefulness of clover, alfalfa, pease, beans, vetches and cow pease as renovating crops, and enforces the importance of these crops to restore fertility to exhausted

soils. The judicious use of mineral fertilizers (containing phosphoric acid, potash and lime) will enable the farmer to grow crops of legumes which, after being fed to his stock, will, with proper care to collect and preserve all manure, both liquid and solid, enable him to return a complete fertilizer in the shape of a barn-yard manure to his land. A further advantage of growing these crops is that the nitrogenous material, protein, which they contain in such great abundance, is especially valuable for fodder.'

From the foregoing it seems that, in the present condition of our knowledge, the conclusion may be drawn that the atmosphere stands ready to furnish the farmer, gratis, with all the organic constituents which his crops require, provided always that he, on his part, will exercise a sufficient amount of skill and intelligence in approaching and retaining on his farm the fertilizing materials, and especially the nitrogen. If he does this, all that is necessary for him to provide, in order to replace the losses which his farm sustains from the sale of stock or produce, are the inorganic or mineral constituents of these, and especially the phosphoric acid and potash. There is much in all this to remind one of Sprengel and Liebig's teaching of fifty years ago, according to which a plant cannot thrive if its soil does not contain all the substances which are to be found in its ash.

UTILIZATION OF SEWAGE.

The losses in fertilizing material which are sustained, as above mentioned, on account of the neglect or unscientific treatment of barn-yard manure, are very trifling when compared with those which the community suffers in the almost total loss of the nitrogen, phosphoric acid and potash contained in human excreta. The utilization of such always becomes a subject for discussion when the question is raised as to how a cheaper class of manures than the artificial fertilizers can be obtained for use in agriculture.

Where the water carriage system of removing sewage and excrement has been introduced, nothing is to be hoped for in the recovery of their fertilizing constituents. Even in cases where, at large expense, establishments have been erected for the treatment of sewage by precipitation or similar methods, the products have been found to be entirely destitute of agricultural value. The greater part of the fertilizing constituents of sewage are in such a soluble condition, and have been diluted with water to such an extent, as to render their recovery economically impossible. It has been attempted in the neighbourhood of many cities in England and on the continent of Europe to use the sewage for irrigation and as liquid manure, but this method of utilization has been found to be in the highest degree imperfect. At Berlin, it has been proved, that of the nitrogen contained in its sewage, at the very most only 13·8 per cent is found in the agricultural products of all the magnificent farms irrigated by it in the neighbourhood of the city. When the use of water for removing house refuse is excluded, and ordure and urine are removed as manure in their natural state, their utilization is possible, and is made a source of revenue in such towns as Stuttgart, Groningen, Greifswald, &c. But the systems of this class which are in use have all their disadvantages, as is proved by the tendency which municipal authorities constantly show to adopt the water carriage system. The greatest disadvantage under which these systems labour is the difficulty caused by the offensiveness to sight and smell of the material with which they have to deal. This has been entirely met by the use of moss litter as an absorbent, deodorizer, and disinfectant.

MOSS MANURE.

The first public mention of the usefulness of moss litter as a deodorizer and absorbent seems to have been made by Dr. Ludwig Happe, in Braunschweig, in December, 1880, since which time its application for the purpose has gradually increased until now, when the system has been introduced into several towns in Germany, and is also practised in Congleton, Cheshire, England. In Canada this method of deodorizing human refuse has been in use for years at Caledonia Springs. It, of course at once recalls

the dry earth system regarding which great expectations were at one time entertained. The advantages of moss litter over dry earth for the purposes in question are, however, very decided. They consist in the perfect inoffensiveness of the moss litter product, in the fact that one part of moss litter will deodorize and dry at least six parts of mixed excreta, and in the greater agricultural value of the resulting manure. Dry earth (which is required in quantity at least equal to that of the excreta) is valueless from an agricultural point of view, but this is not the case with moss litter, which, as its analyses show, often contains as much nitrogen as ordinary barn-yard manure. Numerous analyses have been made of moss litter manure as produced in Germany, and its average contents from seven different towns may here be stated.

	p. cent.	lbs. per ton.	Value per ton.
Nitrogen	0·644	13·28	at 13c. \$1 72
Phosphoric acid.....	0·350	7·00	5 0 35
Potash.....	0·285	5·70	5½ 0 30
Water	83·00		\$2 37

Numerous trials have been made on various crops with this manure, and very satisfactory results are always reported. In all cases it is stated to excel barn-yard manure even when the latter is used in much greater quantity.

In a paper read before the Royal Society of Canada, on May 27, 1902, Mr. T. Macfarlane describes a manner of applying the moss litter, by means of which the quantity used is much reduced, and the value of the resulting manure greatly increased.

Canada possesses in its bogs and swamps inexhaustible quantities of moss litter, which is frequently found in beds several feet in thickness lying above the peat. The following tests have been made in the Inland Revenue Laboratory of moss litter from various localities in the Dominion :—

	Moisture.	Ash.	Nitrogen.
	Per cent.	Per cent.	Per cent.
Moss litter, Berwick, N.S.	14·40	1·16	1·26
Black muck	13·30	3·68	1·58
Moss from Great Village, N.S.	63·44	3·46	0·63
Sphagnum moss from Shippagan, N.B.	12·45	1·55	0·55
Light coloured moss litter from Lincoln Parish, N.B.	11·55	1·40	1·79
Dark coloured sample from the foregoing locality....	10·95	0·80	1·06
Moss litter from Musquash, N.B., upper layer....	11·50	0·95	0·82
Moss litter from same locality, lower layer....	12·50	0·90	0·72
Peat from St. Bridget, Province of Quebec....	13·30	2·50	1·48
Peat from St. Hubert, Quebec....	12·35	2·88	1·84
Light coloured moss litter from Caledonia Springs....	10·00	1·60	2·95
Dark coloured moss litter from same locality....	11·60	2·70	2·28
Peat from the same locality....	10·05	3·90	2·94
Surface moss from the Mer Bleu at Eastman's....	10·85	2·80	0·71
Surface moss from the Mer Bleu at Baldwin's Farm....	7·90	2·66	1·47
Surface moss from the Mer Bleu at Baldwin's Farm, 18 inches deep....	27·90	1·72	1·64
Peat from Mer Bleu at McFadden's Farm, wide ditch, Navan....	22·60	4·40	2·21
Peat from Mer Bleu, McFadden's Farm, narrow ditch, Navan....	9·40	6·62	2·80
Peat from near Stratford, Ont....	16·80	9·10	1·91
Hypnum moss from near Stratford, Ont....	8·75	9·72	2·01
Moss litter from bog in Welland County, Ont....	3·85	4·70	1·51
Peat lying underneath the foregoing....	5·30	4·85	1·41
Peat from the same locality, lying 4½ feet below surface....	3·25	41·25	1·52
Peat from Dobson's bog, near Seaverton, Ont	18·42	9·04	1·89

The manufacture of moss litter has been attempted at Musquash, in New Brunswick, and it is now being produced in Welland county, Ontario. From the latter locality I was supplied with several bales of the moss litter for experimental purposes, and Dr. Laberge, of Montreal, undertook to superintend the carrying out of an experiment to determine its deodorizing and absorbent qualities. He reports that 100 lbs. of moss litter were sufficient for drying 800 lbs. of ordinary excreta from privy pits in Montreal, and rendering it entirely inoffensive. A sample of the product remained for days in my office without attracting notice and, indeed, it was quite devoid of odour. Its analysis gave the following results:-

	p. c.	Lbs. per ton.	Value per ton.
Nitrogen.....	1·31	26·2	at 13c. \$3 41
Phosphoric acid.....	0·90	18·0	" 5 0 90
Potash.....	0·14	2·8	" 5 $\frac{1}{4}$ 0 15
Water.....	65·47		\$4 46

The valuation of ordinary fresh barn-yard manure with 75 per cent of water is about 82 per ton; with 67 per cent water as in the case of the average given above by Dr. Gossmann, the value is nearly \$2.25. Therefore, much better results might be expected agriculturally from a 'moss manure' of the composition just described.

Moss litter might also be applied with great advantage in public urinals. When a sample of it was supersaturated with urine and dried, and this process repeated several times, no offensive odours were developed and the product was found on analysis to contain 12·41 per cent of nitrogen, which is equal to a valuation of \$32.26 per ton.

These facts are reported in order to show that Canada possesses in her waste lands abundance of material which might be used in our towns and villages for the production of a very valuable manure, with the simultaneous introduction of very many sanitary advantages. It is not to be expected that cities or towns which are advantageously situated for the water carriage system, or which have already adopted it, will make any changes, but there are many towns and villages in the Dominion where the application of the moss litter system would be very suitable, and the authorities of which, by selling the product or giving it gratis to the farmers of the neighbourhood, might confer a great benefit on agriculture.